US005496358A

United States Patent [19]

Rosenwald

[11] Patent Number: 5,496,358

[45] Date of Patent: Mar. 5, 1996

[54] **THERMAL WRAP FOR A BODY MEMBER**

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[73] Assignee: **Sport Wrapz, Inc.**, Chicago, Ill.

[21] Appl. No.: **383,958**

[22] Filed: **Feb. 6, 1995**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 76,157, Jun. 14, 1993, Pat. No. 5,395,399.

[51] **Int. Cl.**[6] **A61F 7/00**

[52] **U.S. Cl.** **607/108**; 607/111; 607/112; 607/114; 126/204; 165/46

[58] **Field of Search** 607/108–112, 114; 126/204; 165/46; 62/530; 383/901

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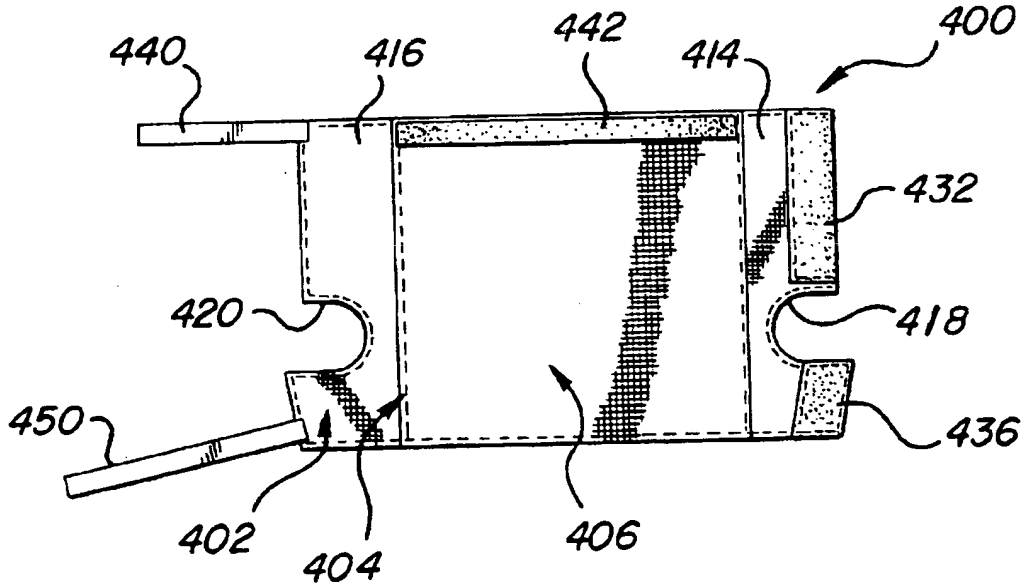
Attorney, Agent, or Firm—Reising, Ethington, Barnard & Perry

[57] **ABSTRACT**

A thermal wrap is disclosed for application to body members, especially joints and limbs. It comprises a pouch for containing a thermal medium and which is constructed of a flexible elastic cloth. The pouch is mounted on a support member, also constructed of a flexible elastic cloth, which is adapted to wrap around a limb or joint. The support member is provided with a wrap fastener such as a hook and loop fastener which is adjustable to establish the desired degree of compression on the affected area. The wrap as applied to a knee and wrist is provided with cinch bands which encircle the limb at locations above and below the pouch. This arrangement provides compression under the bandwidth of the pouch which is independently adjustable relative to the compression under the cinch bands. Additionally, a pressurized air bladder may be provided to independently adjust the compression under the bandwidth of the pouch. Other advantageous features of the wrap that specifically relate to thermal wrapping an ankle and shoulder are also disclosed.

1 Claim, 8 Drawing Sheets



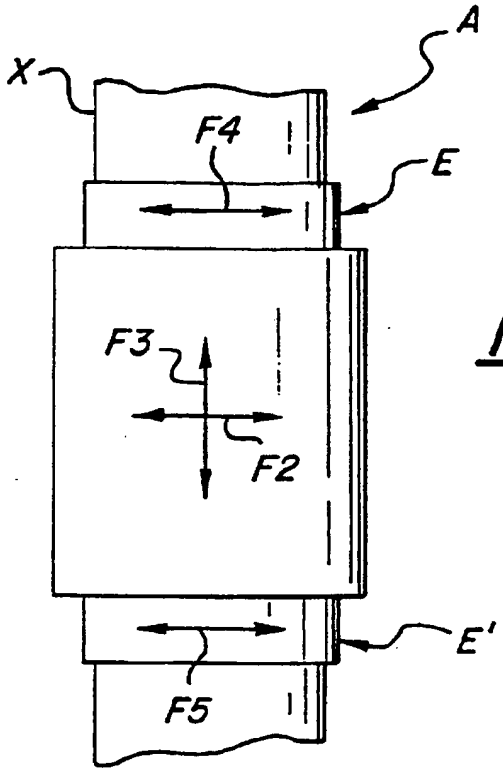


FIG-1

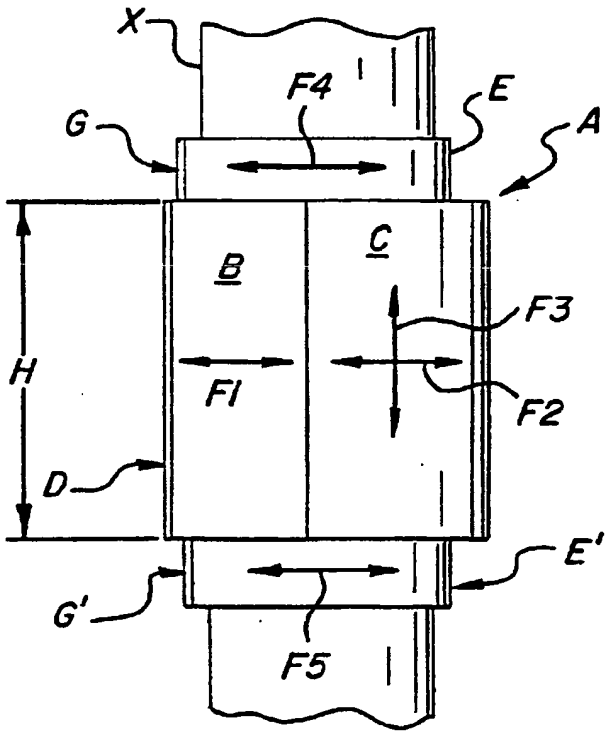
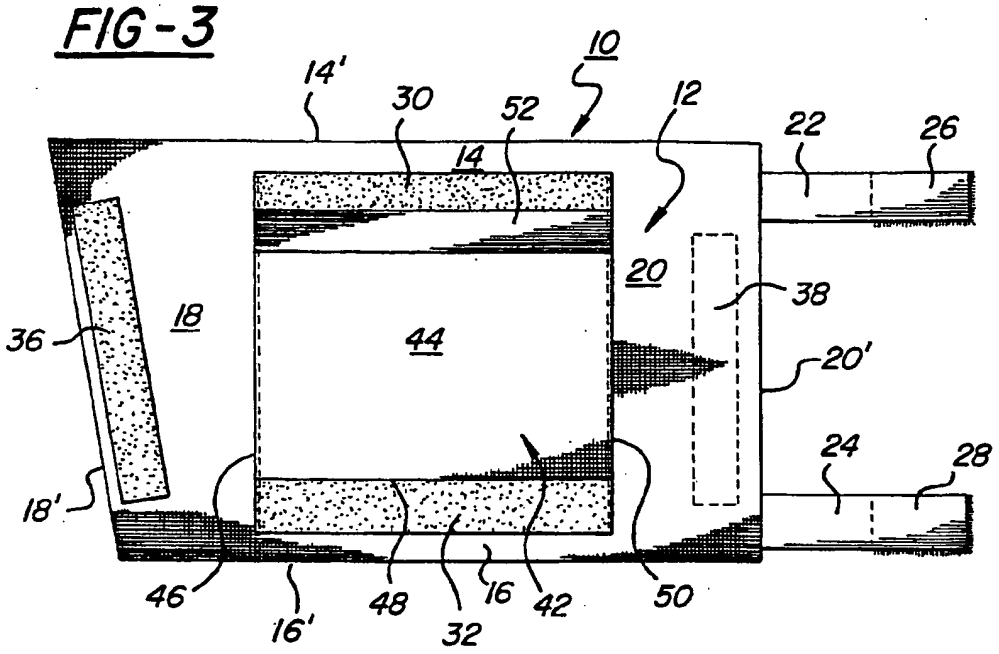


FIG-2

FIG-3


14'
30
52
10
12
22
26
14
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38
18
36
44
20'
24
28
18'
46
16'
48
32
16
42
50

FIG-4

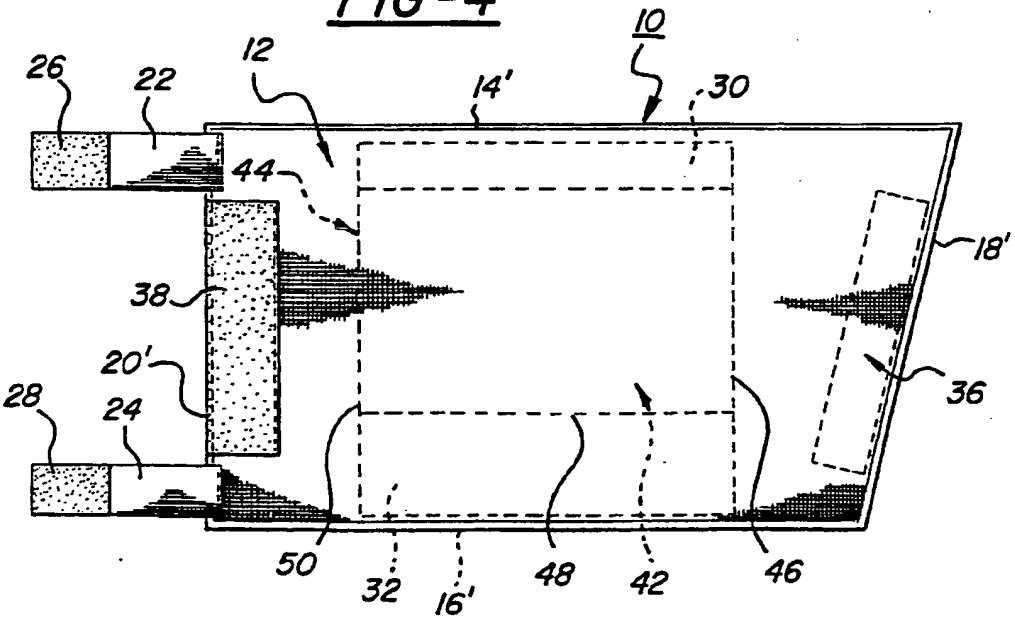

26
22
12
14'
10
30
44
18'
38
20'
36
28
24
50
32
16'
48
42
46

FIG-5

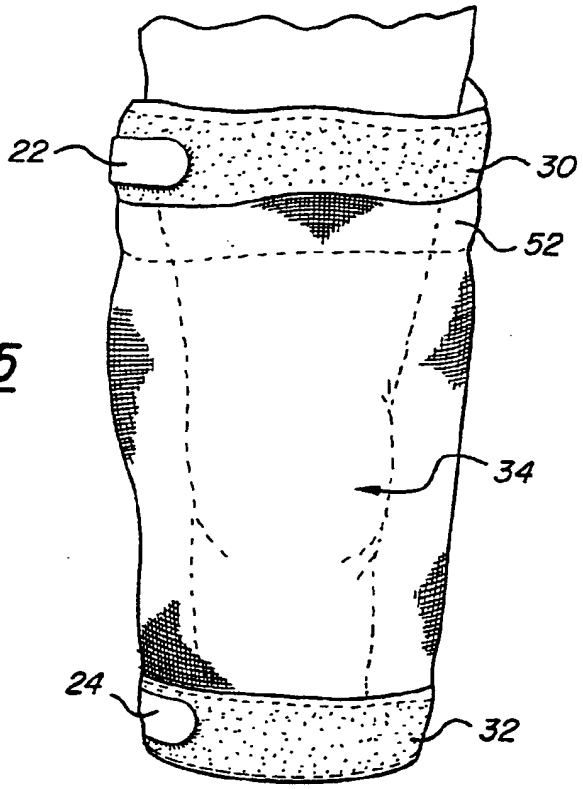
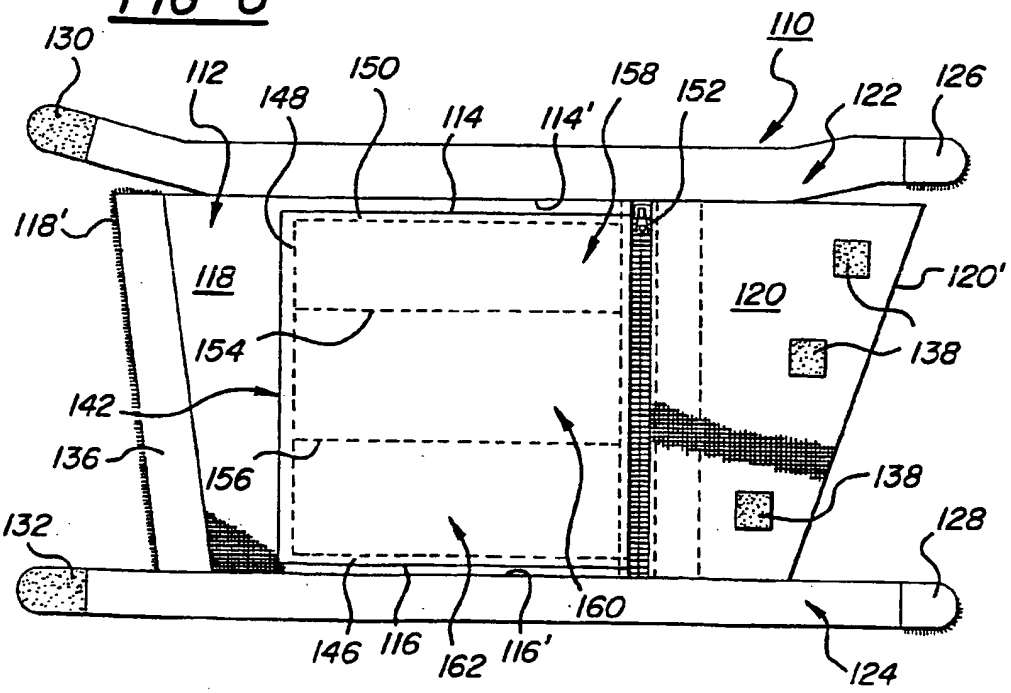

22
30
52
34
24
32

FIG-6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114'
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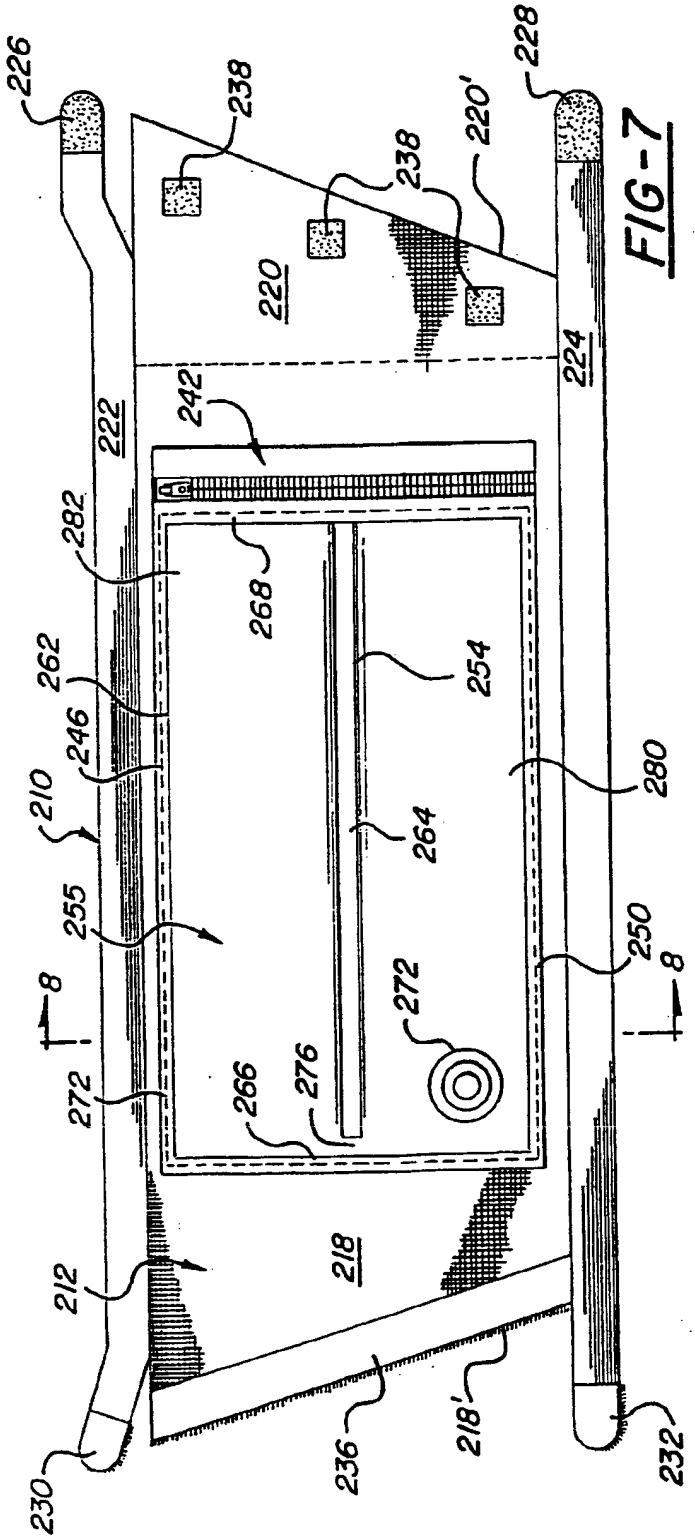
132
128
160
146
116
162
116'
124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238
238
220'
228
220
224
222
242
282
268
254
262
246
210
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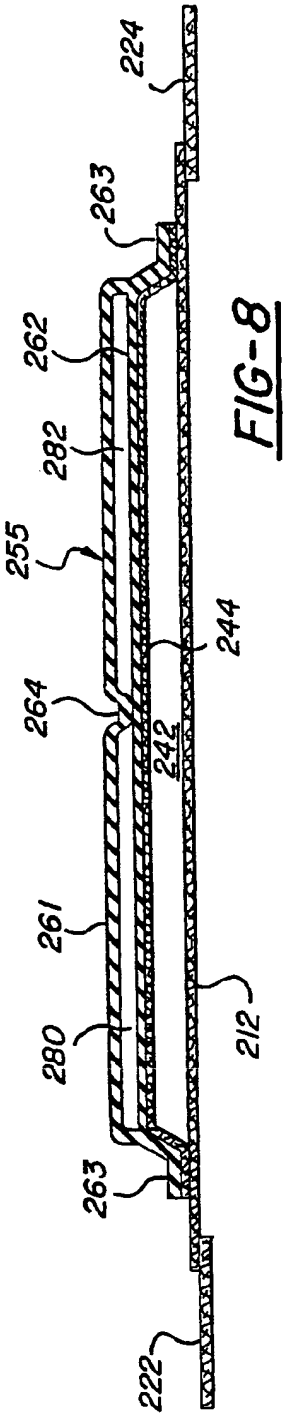
264
255
250
8
8
272
266
276
272
218
212
230
236
218'
232

FIG-7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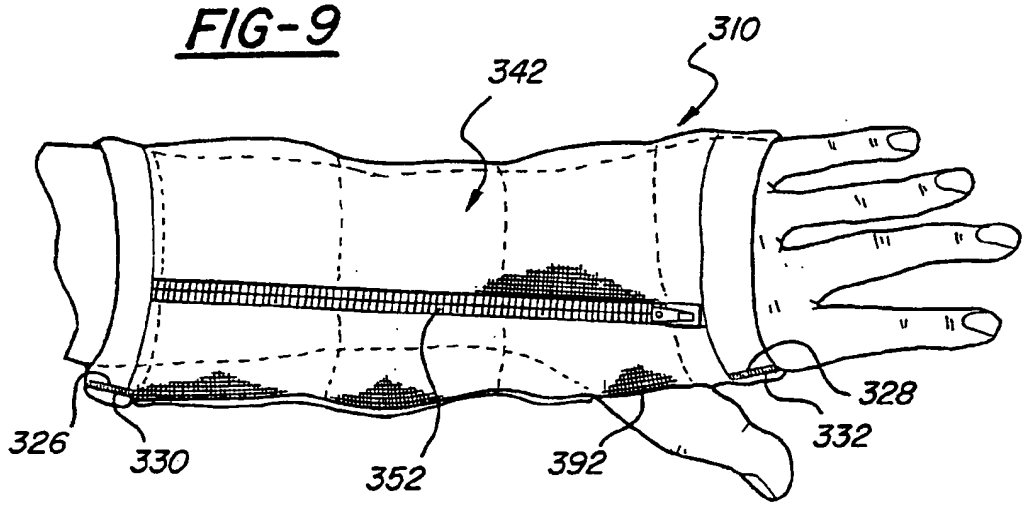
263
222

FIG-8

FIG-9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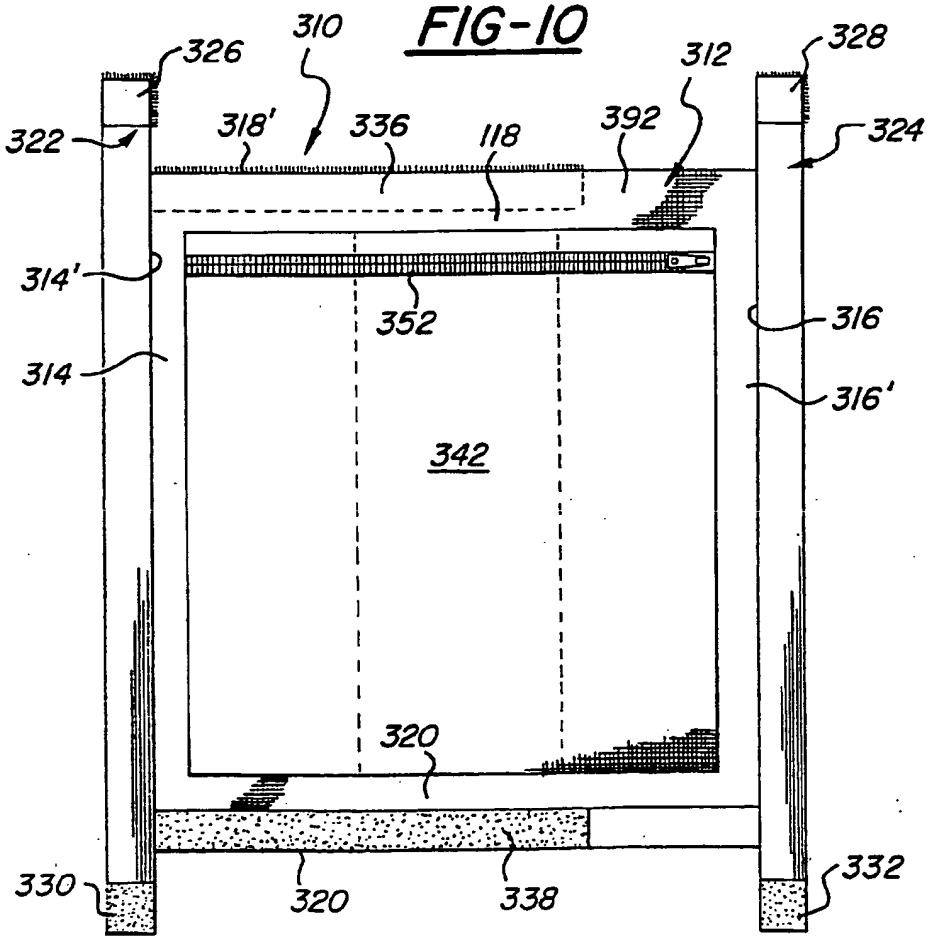
352
392
328
332

FIG-10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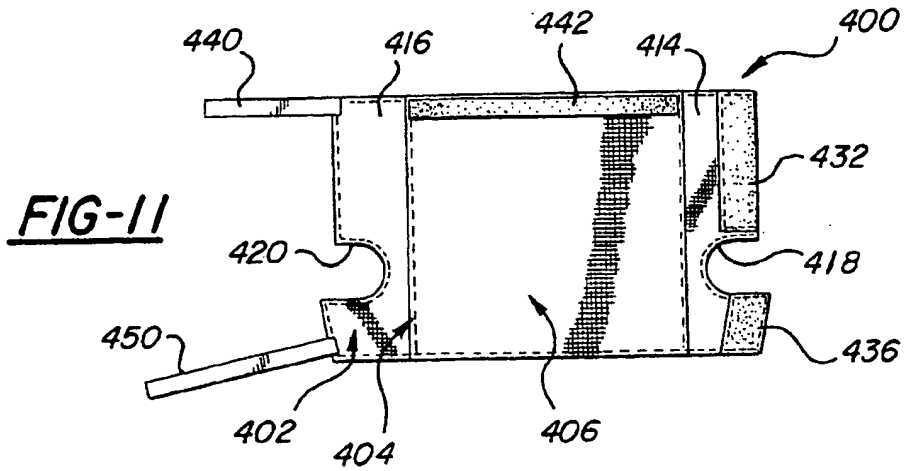

FIG-11

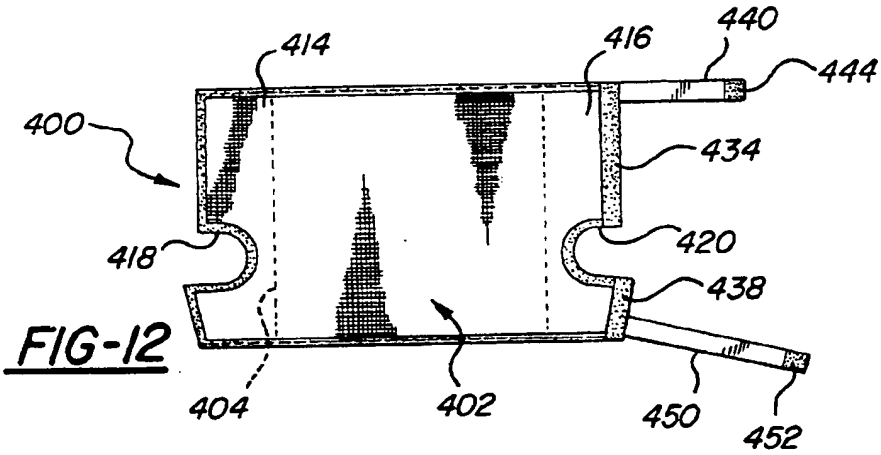

FIG-12

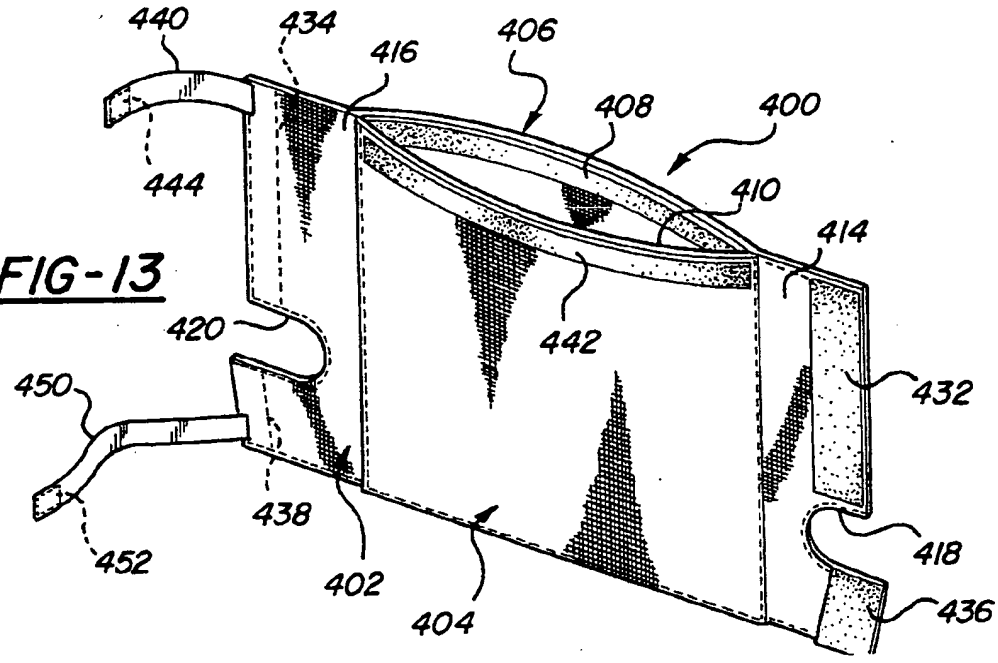

FIG-13

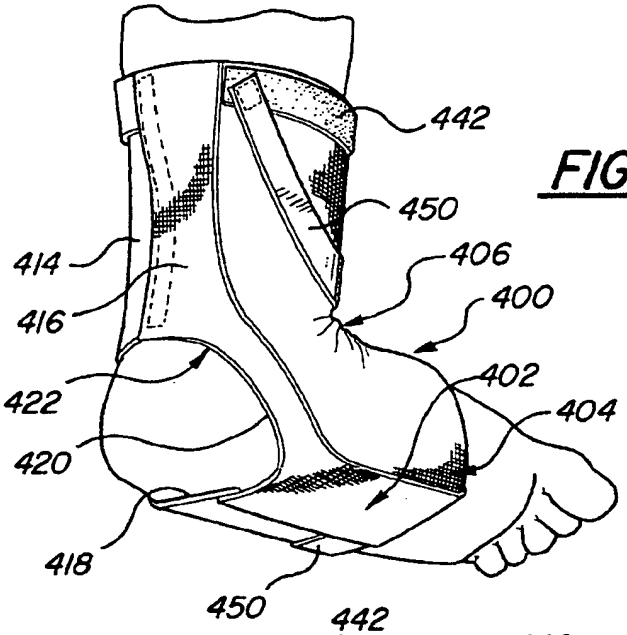

FIG-14

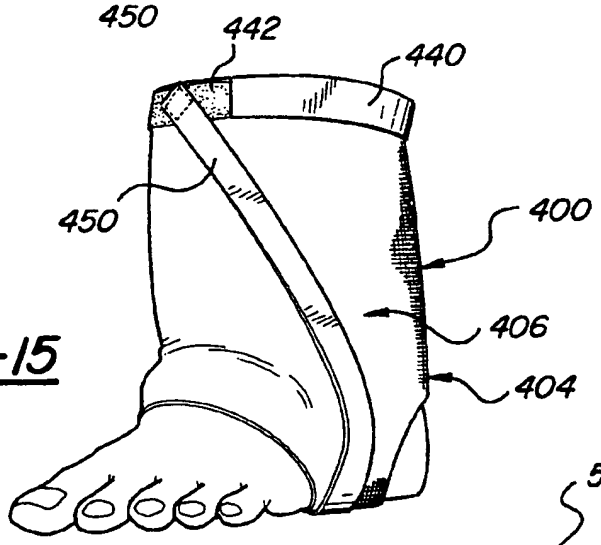

FIG-15

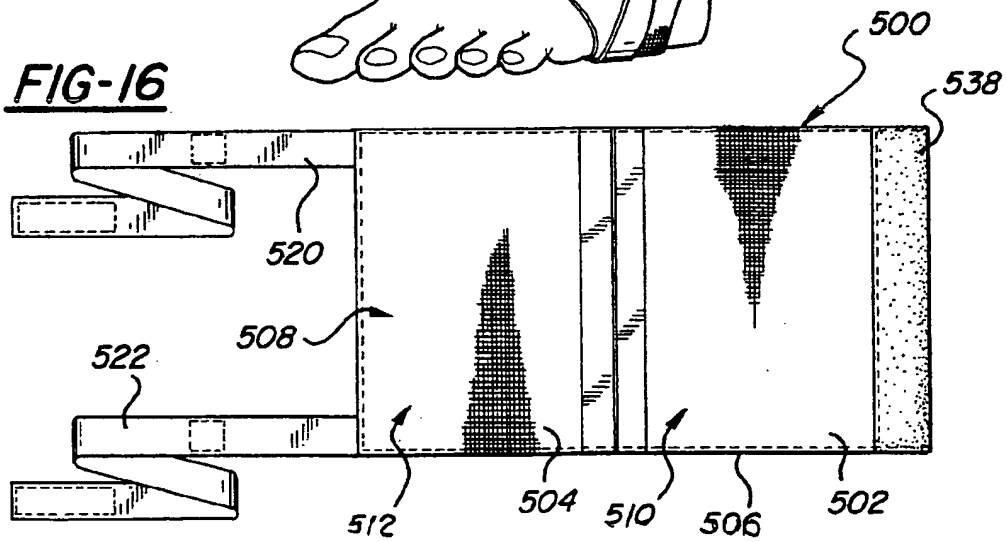

FIG-16

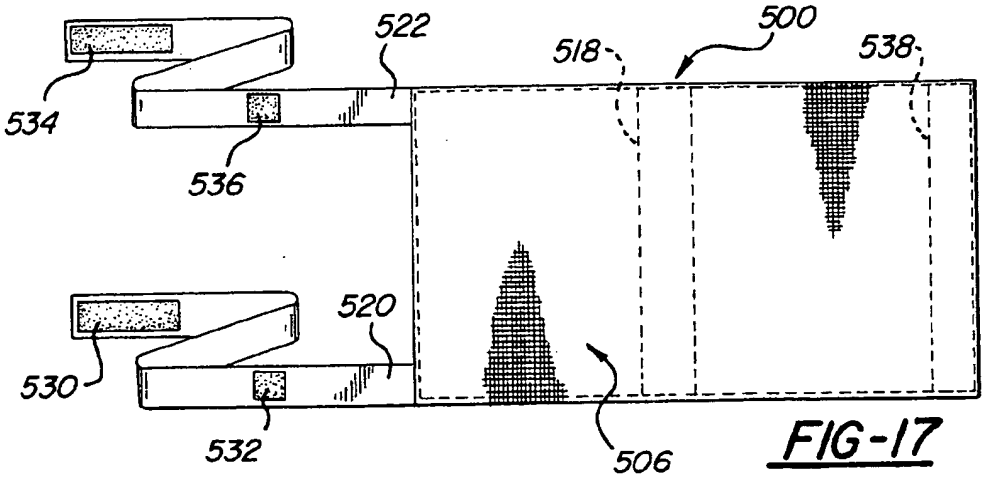

FIG-17

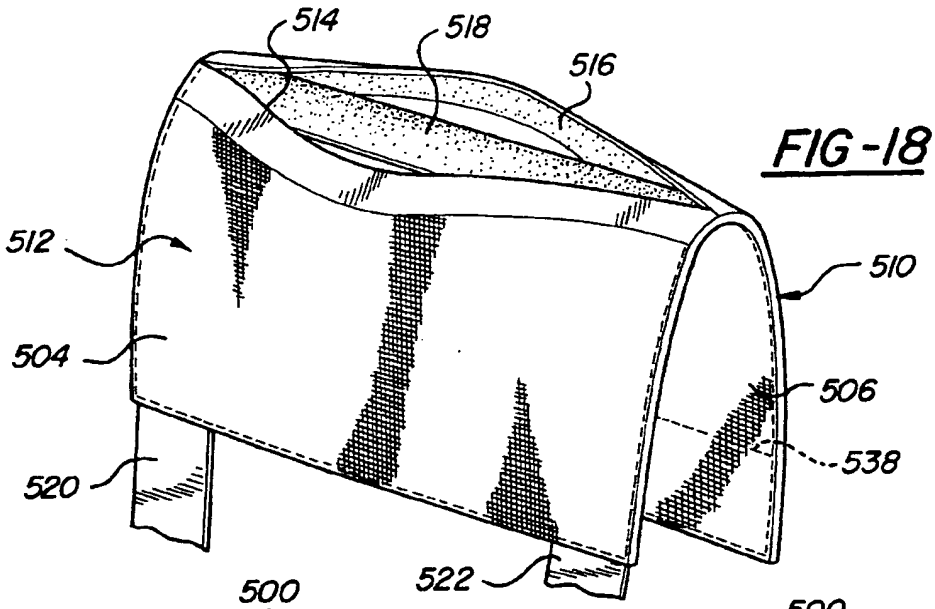

FIG-18

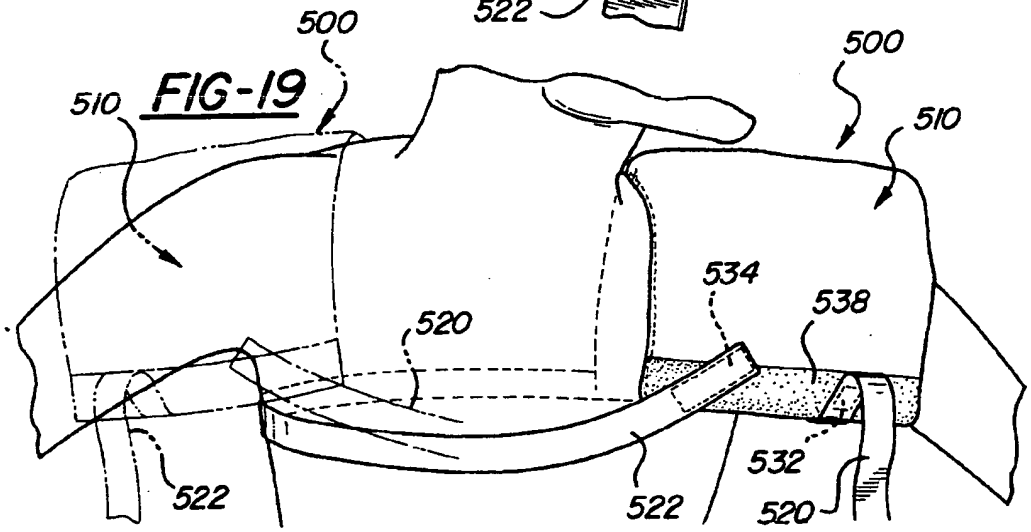

FIG-19

THERMAL WRAP FOR A BODY MEMBER

This is a continuation-in-part of U.S. patent application Ser. No. 08/076,157 filed Jun. 14, 1993 now U.S. Pat. No. 5,395,399.

FIELD OF THE INVENTION

This invention relates to thermal wraps useful for applying heat or cold to a member of the body. It is useful for either therapeutic or preventive treatment.

BACKGROUND OF THE INVENTION

There is a need for a thermal wrap which will effectively apply heat or cold to a limb, joint or other body member and also permit mobility with minimal encumbrance of freedom of movement. The thermal wrap must be easy to apply with a desired tightness. Further, it must be comfortable for the user and should allow vigorous activity of the body without becoming displaced from the affected area. It should, for example, withstand athletic activity such as running and skiing and also be suitable for a sedentary user. Further, the thermal wrap should be of low cost and it should accept a thermal medium for either cold or hot treatment. The thermal wrap should also be durable and reusable and preferably it should be made of breathable material.

It is well known that the application of heat or cold provides effective therapy for muscle and joint injuries. When properly applied, a thermal wrap is effective to provide pain relief from sprains, strains, bruises, muscle trauma and other injuries to the body. For effectiveness, the thermal wrap should provide intimate engagement of the thermal medium, whether hot or cold, with the affected area to obtain optimum heat transfer. In some applications, a controlled degree of compression on the affected area is desirable for enhancing the therapeutic effect.

Thermal wraps of wide variety have been proposed in the prior art. However, none has satisfactorily met the needs for a thermal wrap in regard to therapeutic effectiveness together with ease of use and mobility, as discussed above.

The Palmacci U.S. Pat. No. 4,976,262 granted Dec. 11, 1990 discloses an ice bag holding device especially adapted for application to the knee. This thermal wrap holds an ice bag of special design against the affected area by wrapping it around the knee joint and uses hook and loop fasteners for holding it in a stretched condition. The wrap is constructed of a stretchable material.

The Tampa U.S. Pat. No. 4,628,932 granted Dec. 16, 1986 discloses a knee ice pack which is wrapped around the knee and fastened with hook and loop fasteners. Waterproof compartments for holding ice are provided with a zipper closure at the top.

The Hubbard et al. U.S. Pat. No. 4,688,572 granted Aug. 25, 1987 discloses a thermal pack for application to the knee. This thermal pack comprises first and second pockets for holding thermal material which are connected together by a stretchable section. The thermal pack is wrapped around the knee with the stretchable section over the knee cap and held in place by straps in the region of the pockets which are secured by hook and loop fasteners.

Other prior art devices are described in the following patents: Murphy U.S. Pat. No. 5,074,300 granted Dec. 24, 1991 for "Reusable Fabric-Covered Heat-Exchange Bag"; Laroco U.S. Pat. No. 4,899,749 granted Feb. 13, 1990 for "Thermal Vascular Dilating Device And Method"; Swearingen U.S. Pat. No. 4,805,619 granted Feb. 24, 1989 for "Therapeutic Cooling Scarf, Wrap Or Collar"; Hanson et al. U.S. Pat. No. 4,776,042 granted Oct. 11, 1988 for "Cryokenetic Headband"; Abt U.S. Pat. No. 4,641,655 granted Feb. 10, 1987 for "Therapeutic Cooling Wrap"; and Waldrum U.S. Pat. No. 2,949,914 granted Aug. 23, 1960 for "Ankle Ice Pack".

A general object of this invention is to provide an improved thermal wrap which overcomes certain disadvantages of the prior art.

SUMMARY OF THE INVENTION

This invention provides a thermal wrap which is easy to use and which allows for mobility including vigorous activity without unwanted displacement while providing effective therapy to the affected area.

In accordance with the invention, this is provided by a thermal wrap comprising a flexible pouch for containing a thermal medium with a fastener system which keeps the pouch in place over the affected area with a controlled degree of compression on the affected area. A wrap fastener is effective over the pouch bandwidth to establish the amount of compression applied to the affected area and one or more adjustable cinch bands, which engage the body member remote from the affected area, apply an adjustable amount of holding force independently of the compression applied over the pouch bandwidth.

Further, in accordance with this invention, a controlled compression may be applied to the affected area independently of the tightness of the cinch bands. This is accomplished by an air bladder overlying the thermal pouch which may be pressurized to obtain the desired degree of compression applied directly to the affected area under the pouch.

These and other features, advantages and objects of the thermal wrap of the present invention will become more apparent from the preferred embodiments of the thermal wrap as specifically applied to various joints of the body including wrist, knee, ankle and shoulder and wherein a complete understanding of this invention may be obtained from the detailed description that follows taken with the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic representation of the thermal wrap in a frontal view;

FIG. **2** is a side view of the thermal wrap of FIG. **1**;

FIG. **3** is a view of the knee wrap showing the outer surface laid flat;

FIG. **4** shows the inner surface of the wrap of FIG. **3**;

FIG. **5** shows the knee wrap in place on a person's knee;

FIG. **6** shows a second embodiment of the knee wrap;

FIG. **7** shows a third embodiment of the knee wrap with an air bladder for compression control;

FIG. **8** is a cross-sectional view taken on lines **8**—**8** of FIG. **7**;

FIG. **9** illustrates a wrist wrap in place on a person's wrist;

FIG. **10** shows the wrist wrap in a view of the outer surface laid flat;

FIG. **11** is a view of an ankle wrap according to the invention laid flat with its outer side facing outward;

FIG. **12** is a view of the inner side of the ankle wrap;

FIG. **13** is a perspective view of the ankle wrap;

FIG. 14 is a view showing the ankle wrap in place on a person's ankle when looking from a rear view point;

FIG. 15 is view like FIG. 14 but from a frontal view point;

FIG. 16 is view of a shoulder wrap according to the invention laid flat with its outer side facing outward;

FIG. 17 is a view of the inner side of the shoulder wrap;

FIG. 18 is a perspective view of the shoulder wrap; and

FIG. 19 shows the shoulder wrap in place on a person's shoulder and includes a phantom line view showing the same shoulder wrap in place on this person's other shoulder.

BEST MODE FOR CARRYING OUT THE INVENTION

Referring now to the drawings, illustrative embodiments of the invention are shown in a thermal wrap for therapeutic use on a limb or joint of a person. The thermal wraps shown will be described for application to joints of the body. It will be appreciated, as the description proceeds, that the invention is adapted for a variety of applications and may be realized in other embodiments.

Before describing the structure of the thermal wrap in a specific application, the concept, principles of construction and application of the invention will be described with reference to FIGS. 1 and 2. These figures are a schematic representation of the invention and illustrate the function of the main structural parts and also illustrate the relative forces which may be obtained in use of the invention.

In the schematic drawings of FIGS. 1 and 2, a persons limb, e.g. leg, is represented by a cylindrical member X and is shown in front and side views. The thermal wrap A of this invention is applied to the limb by wrapping it around the limb and fastening it in place. The thermal wrap A comprises a support member B which is constructed of a generally rectangular flexible elastic sheet. A pouch C is mounted on the support member B and has inner and outer walls or panels each of which is constructed of a flexible elastic sheet. The outer panel is attached around its periphery to the support member and the underlying portion of the support member constitutes the inner panel. The pouch C is adapted to contain a thermal medium such as ice or a sealed gel package, and is provided with an opening and suitable closure for inserting and removing the thermal medium.

For application of the thermal wrap A to the limb, the support member B is wrapped around the limb in a single layer except for overlapping of the lateral edges by an amount depending upon the lateral dimensions. Preferably, the medium is inserted into the pouch C prior to wrapping. The wrap is positioned circumferentially on the limb so that the pouch C overlies the affected area to be treated. The amount of radial compression to be exerted by the wrap on the affected area of the limb is determined by the adjustment of an adjustable wrap fastener D which is engaged and tightened as desired when the wrap is applied and which is readjustable afterward. Preferably, the wrap fastener D is adapted for establishing substantially uniform tension in the support member B throughout a bandwidth H having a dimension about the same as the vertical length of the pouch C (herein called the "pouch bandwidth").

In order to secure the thermal wrap A in place on the limb so that it remains substantially fixed despite movement of the limb, an upper anchor or cinch band E is provided and preferably, but optionally, a lower cinch band E' is provided. The cinch bands E and E' are provided, respectively, with fasteners G and G' which are individually adjustable to establish the tension in the cinch bands E and E', respectively. Each of the cinch bands E and E' may constructed of an axial extension of the support member B with a strap secured to and partially overlapping the extension. Each of the cinch bands E and E' may be provided with an elastic section which has an elasticity different from that of the remainder of the band.

The use of the thermal wrap depicted in FIGS. 1 and 2 will now be described with reference to the stresses in and the forces exerted by different parts of the wrap. A tensile stress F1 is established in the support member B and is substantially uniform in the pouch bandwidth. This tensile stress F1 is determined by the amount the support member B is stretched when the fastener D is secured. This tensile stress F1 is effective to apply a radial compressive force over the encircled portion of the limb and may be adjusted to suit the needs of the user. There is also a tensile stress F2 in the circumferential direction in the outer panel of the pouch C. The tensile stress F2 will be greater or lesser than the tensile stress F1 depending upon the elasticity of the outer panel relative to the inner panel and depending upon the amount of stretching of the outer panel due to the filling of the pouch C with a thermal medium. There will also be an axial stress F3 in the outer panel of the pouch due to the filling of the pouch. These stresses in the outer panel, especially the stress F2, and hence the radial compression applied thereby are of importance in the use of the thermal wrap because it may increase the radial compression force applied to the affected areas of the limb. If the thermal medium is granular or chunky, such as ice, a comfort factor may be involved.

As discussed above, the wrap A is held in a wrapped condition around the limb by the fastener D. The compressional force exerted by the wrap on the limb over the pouch bandwidth, may be adjusted from substantially zero to a relatively large value. This radial compression does tend to hold the thermal wrap in place but additional holding is required depending upon the expected activity of the limb. This is provided by the cinch bands E and E', at least one of which is required. If only one is used, it is preferably the upper cinch band E and, for a greater holding effect, both are preferably used. The tensile stress F4 in the cinch band E is established by the amount of stretch in the band E when the fastener G is secured. The same is true of the tensile stress F5 in the band E'. In the respective cinch bands E and E', the tensile stresses F4 and F5 are independently adjustable and determine, respectively, the radially extending compressive forces on the limb and hence, the holding force of each.

It is especially noteworthy that the compressive force applied to the affected area of the limb, i.e. under the pouch bandwidth, is adjustable independently of the holding force provided by the cinch bands. Further, the compression applied under the pouch may be different from the compression applied under the remainder of the pouch bandwidth, depending upon the construction of the pouch. This independent relationship between the compression on the affected area by the pouch bandwidth and that under the cinch bands is extremely important in the use of the thermal wrap. It allows the thermal treatment of the affected area to be optimized by establishing the compression in the pouch bandwidth in accordance with the condition of the affected area. This compression may range from substantially zero to a relatively high value. At the same time, the radial compression established in the upper and lower cinch bands may be adjusted independently of the pouch bandwidth and independently of each other. This combination enables the optimum treatment of the affected area with a selected compression while permitting the holding force of the

thermal wrap to be adjusted in accordance with the desired degree of activity of the limb. Thus, the effectiveness of the thermal wrap may be maximized while the mobility and the comfort of the user are also maximized.

Preferred Embodiments

In view of the foregoing discussion of the thermal wrap of this invention, several different embodiments and the details of construction will now be described setting forth the best mode now contemplated for carrying out the invention.

The Knee Wrap (First Embodiment)

Referring now to FIGS. **3**, **4** and **5**, the invention will now be described in a knee wrap application.

The knee wrap **10** comprises, in general, a support member **12** which carries a flexible pouch **42** having a pouch wall or panel **44** secured to the support member **12**. The placement of the pouch panel **44** on the support member **12** provides a top border **14** between the top edge **14'** and the pouch and it also provides a bottom border **16** between the bottom edge **16'** and the pouch. Similarly, it provides a left side border **18** and a right side border **20** between the side edges **18'** and **20'**, respectively. The support member **12** is provided with a compression adjustment or wrap fastener which comprises first and second coacting parts **36** and **38**. It is also provided with upper and lower flexible straps **22** and **24**, respectively, which form a part of the upper and lower cinch bands. Upper and lower cinch band fasteners comprise, respectively, coacting parts **22** and **36** for the upper fastener and parts **24** and **36** for the lower fastener. The wrap **10** is shown in FIG. **5** as it appears when it is applied by wrapping around a person's knee **34**.

The structure of the knee wrap of FIGS. **3–5** will now be described in more detail. The support member **12** comprises a flexible elastic sheet of cloth which is generally rectangular in shape and suitably trapezoidal to account for the diminishing diameter of the leg area from above the knee joint to below it. The support member is dimensioned from top to bottom so as to cover the knee and from side-to-side so as to permit wrapping of a single layer around the knee joint with some overlap of the fastener parts **36–38**. The cloth of the support member **12** is preferably a stretch fabric such as those sold under the names "Darlexx"™, "Lycra"™ or "Spandex"™ which provide omnidirectional elasticity. In some applications, the cloth may be "Neoprene™" rubber or it may be a paper-like material with a plastic coating or binder as "Tyvek"™ (a trademark of Dupont) which is made of one hundred percent high density polyethylene fillers and binders (Hdep-2). The edges **14'**, **16'**, **18'** and **20'** of the support member **12** are folded over upon themselves and joined to the support member **12** along a line by stitching (not shown) to form a double layer.

The flexible pouch **42** comprises the outer pouch panel **44** which is disposed in face-to-face relation with a central portion of the support member **12** and is joined thereto by stitching **46**, **48** and **50**. The pouch panel **44** is preferably joined, as described, to the support member **12** with both of them in an unstressed condition to form an expandable pouch which is formed by the outer panel **44** and an inner panel which comprises the facing portion of the support member **12**. The pouch has an opening at the upper edge in the region between the stitching **46** and **50** for insertion and removal of the thermal medium. The panel **44** is preferably constructed of the same material as support member **12**. A closure is provided for the opening to ensure containment of the thermal medium. This closure comprises a two-part fastener of the hook and loop type and comprises coacting fastener strips **30** and **52**. The fastener strip **30** extends across the top of the pouch and is mounted on the support member **12** as by stitching (not shown). The fastener strip **52** is mounted on the inner side of the panel **44** and extends across the opening but is of narrower width than the strip **30**. This leaves the upper portion of the fastener strip **30** exposed for a purpose which will be described below.

The wrap fastener for securing the overlapping ends of wrap together comprises a hook and loop fastener with the fastener strips **36** and **38**. The fastener strip **36** is mounted on the left side border **18** substantially parallel to the left side edge **18'** on the outer face of the support member **12**. The coacting fastener strip **38** is mounted on the border **20** substantially parallel to the right side edge **20'** and on the inner face of the support member **12**.

For securing the thermal wrap in place on the limb, the upper cinch band is provided which comprises the flexible elastic strap **22** and the upper border **14** of the support member **12**. The strap **22** is secured by stitching at one end to the right side border **20** in alignment with the upper border **14**. Similarly, the lower cinch band comprises an flexible elastic strap **24** and the lower border **16** of the support member **12**. The strap **24** is secured by stitching to the right side border **20** in alignment with the lower border **16**. An adjustable fastener for the upper cinch band is provided by a hook and loop fastener comprising a fastener patch **26** and a coacting strip **30**. The patch **26** is mounted by stitching on the free end of the support strap **22**. Similarly, an adjustable hook and loop fastener is provided for the lower cinch band and comprises a patch **28** mounted on the free end of support strap **24** and a coacting strip **32** mounted on the exposed face of the pouch panel **44** by stitching.

The fasteners referred to above as hook and loop fasteners are of the type sold under the name "Velcro™". It will be understood that other fasteners which provide adjustability may be used for the cinch and wrap fasteners such as strap-and-buckle fasteners, snap fasteners and tie strings and such others as will occur to those skilled in the art. Other closure fasteners for the pouch include plastic zip-lock fasteners (like foodbag closures), zippers and such other devices as will occur to those skilled in the art.

The pouch **42** is adapted to receive a thermal medium such as ice, hot water, pre-packaged gels and anti-freeze liquids. Preferably, the thermal medium is a pre-packaged gel of the type which may be heated or chilled and is flexible even when chilled.

For use with the pre-packaged thermal material, the pouch of the thermal wrap does not need to be waterproof. However, if the pouch is to be filled with ice or water, waterproof construction is required. Waterproof construction may be provided by using a waterproof material for the support member **12** such as "Darlexx"™, rubber or "Tyvek"™ referred to above. Depending upon the materials selected for the pouch panel **44** and the support member **12**, the joinder therebetween along the lines **46**, **48** and **50** may be provided by known techniques such as thermal welding, laser welding, laser enhanced bonding or heat staking. For a waterproof pouch, the closure fastener may be provided by a water-tight zipper or a plastic zip lock. One example of a preferred material for a waterproof pouch uses "Darlexx"™ style 3650 (available from Darlington Fabrics Corp., New York, N.Y.) for both the support member **12** and the pouch panel **44**. The seams are formed by laser enhanced bonding, a process by which a laser beam drives a polymer adhesive bonding agent into the materials being joined. This process

is available from Lightseam Technologies, Inc. of Golden, Colo. Also the seams of "Darlexx"™ may be formed by liquid adhesive such as GE Primer 118 and GE Silicon 4179 available from General Electric Company of Schenectady, N.Y. Also, seams may be formed by composite tapes having a thermoplastic adhesive layer and an outer layer for abrasion resistance and appearance such as that available from Electro-Seal Corporation or Mann Industries. Such seam tapes can be applied with hot-air sealers available from Pfaff Corporation.

The Knee Wrap (Second Embodiment)

A second embodiment of the knee wrap is shown in FIG. **6** and is similar to that of FIGS. **3**, **4** and **5**. In the description of this embodiment, the reference numbers used in FIG. **6** for parts which correspond to parts in FIGS. **3**, **4** and **5**, are greater by one hundred than the numbers in FIGS. **3**, **4** and **5**.

Referring now to FIG. **6**, the construction of the support member **112** is similar to support member **12** of the first embodiment and differs in that the upper and lower borders **114** and **116** are relatively narrower and the upper and lower cinch bands comprise separate straps **122** and **124**. The straps are joined to the support member **112** by stitching and are constructed of a less easily stretched material (i.e. having a higher stretch modulus of elasticity) than material of the support member. The strap **122** is provided with a hook and loop fastener comprising a patch **126** mounted on one end of the strap and a coacting patch on the other end. Similarly, the strap **124** is provided with a fastener comprising a patch **128** mounted on one end and a coacting patch **132** mounted on the other end.

The pouch panel **144** is of the same construction as the pouch panel **44** of the first embodiment except that the opening is provided on the side of the pouch **142** and the closure fastener comprises a zipper **152**. A further difference is that the pouch **142** is divided into plural compartments **158**, **160** and **162** by a pair of joinder lines connecting the panel **144** to the support member **120** which are provided by stitching **154** and **156**. This arrangement is especially useful for a thermal medium of flowable constituency such as granular, gel or liquid material to ensure an even distribution thereof over the affected area.

The second embodiment, as shown in FIG. **6**, is provided with a wrap fastener similar to that of the first embodiment. It differs in that discrete fastener patches **138** (instead of a continuous strip **38**) are mounted on the right hand border **120** for coacting with the velcro strip **136** on the left hand border **118**.

The second embodiment, may have a non-waterproof pouch or a waterproof pouch by selection of the appropriate materials and parts as discussed above.

The Knee Wrap (Third Embodiment)

A third embodiment of the invention in a knee wrap is shown in FIGS. **7** and **8**. This embodiment is like the second embodiment except that a pressurized air bladder is added for adjustment of the radial compression applied to the affected area. In this embodiment, those parts which correspond to similar parts in the second embodiment are referred to by the same reference numbers except that the first digit is "2" instead of "1". The construction of the support member **212**, the thermal medium pouch **242** and the fasteners are the same as in the second embodiment. The difference is that the air bladder **255** is superimposed on the pouch **242**.

The air bladder **255** comprises a thin airtight flexible elastic bladder joined around its periphery to the panel **244** to provide an airtight enclosure. Preferably, the bladder material has a much higher stretch modulus than panel **244**. The bladder **255** has outer and inner walls **261** and **262** which are joined at their peripheral edges to form a flange **263**. It is suitably constructed of rubber and the seams may be formed by vulcanizing. The flange which encircles the bladder serves for securement to the panel **244** and support member **212**. For this purpose, the flange **263** is joined by stitching **246** and **250** along its upper and lower edges, respectively, to the panel **244** and the support member **212**; is joined by stitching **266** and **268**, along its sides to the panel **244** and support member **212**. Additionally, the walls **261** and **262** of the bladder are joined together by a joint **264** which provides side-by-side bladder compartments **280** and **282**. The joint **264** has one end **276** spaced from the end of the bladder to provide an air passage between the compartments **280** and **282**. The joint **264** restricts the bulging of the panel **262** and the deformation of the panel **244** which might otherwise occur. The joint **264** also facilitates bending of the wrap along the line of the joint and minimizes interference with the flexing of the knee being treated.

In order to pressurize the air bladder **255**, an air pump **272** is built into the air bladder **255**, as shown in the lower left hand corner of the air bladder. The pump **272** is manually actuated by a finger or thumb to pump air into the bladder and is manually actuated to release pressure as desired. The pump **272** is like that used in the high top basketball shoes sold by Reebok and known as "THE PUMP"™. Obviously, a pump which is separate and detachable from the thermal wrap may be used if desired. Such a pump, with a suitable valve in the bladder, may be like those used for inflating basketballs and footballs.

When the air bladder **255** is not pressurized, the thermal wrap **210** functions in the same manner as the thermal wrap **110**. When the air bladder **255** is pressurized, the wrap fastener, comprising fastener parts **236** and **238**, is tightened and the air bladder expands against the pouch **242** and increases the compressive force applied to the limb.

The Wrist Wrap

An embodiment of the invention for use as a thermal wrap for a wrist is shown in FIGS. **9** and **10**. It is similar to the second embodiment of the knee wrap shown in FIG. **6**. In FIGS. **9** and **10**, those parts which correspond to similar parts in FIG. **6** are referred to by the same reference numbers except that the first digit is "3" instead of "1".

Referring now to FIGS. **9** and **10**, the construction of the support member **312** is similar to support member **112** of FIG. **6** except that it is rectangular instead of trapezoidal.

The pouch **342**, the cinch bands comprising straps **322** and **324**, and the cinch band fastener parts **326–330** and **328–332** are the same as FIG. **6**.

The wrap fastener is similar to that of FIG. **6** except that the hook and loop fastener strips **336** and **338** do not extend the full width of the pouch **342** thereby leaving an opening in the wrap for the thumb of the user.

As illustrated in FIG. **9**, the wrist wrap is applied to the wrist by wrapping it around the lower arm and wrist with the thumb extending through the opening **392** and engaging the wrap fastener parts **336** and **338**. Then, the lower strap **324** is pulled to the desired tightness around the hand and the cinch band fastener parts **328–332** are engaged. Finally, the

cinch band comprising strap **322** is tightened as desired around the arm and the cinch band fastener parts **326** and **330** are engaged.

The Ankle Wrap

An embodiment of the invention for use as a thermal wrap for an ankle is shown in FIGS. **11–15** and is generally designated as **400**. The ankle wrap **400** like in the previously described embodiments includes flexible elastic cloth members or panels **402** and **404** that are stitched together so as to co-operatively define a flexible elastic pouch **406** that is adapted to receive a thermal medium. The latter is retained in the pouch by hook and loop fastener strips **408** and **410** stitched to the opposite inner sides of the top of the pouch as seen in FIG. **13**.

The ankle wrap **400** is adapted to be wrapped partially about a lower leg region and an ankle and an upper foot region of a person as shown in FIGS. **14** and **15** and provide adjustable pressure of the pouch against the ankle as will now be described.

The inner elastic cloth panel **402** includes a first flexible elastic border portion **414** extending along one lateral side of the pouch and a second flexible elastic border portion **416** extending along an opposite lateral side of the pouch. The border portions **414** and **416** are adapted to be brought together in an overlapping relationship in locations behind the lower leg region and under a midportion of the foot when the pouch is wrapped about the lower leg region and ankle and upper foot region as shown in FIGS. **14** and **15**.

A gap **418** and **420** is provided in the respective border portions **414** and **416** at a location about one-third of the length of the wrap from the bottom as viewed in FIGS. **11–13** and these gaps co-operatively define an opening **422** of generally circular shape in these border portions adapted to receive the heel of the foot when the pouch **406** is wrapped about the lower leg region and ankle and upper foot region and these border portions are brought in to overlapping relationship as shown in FIG. **14**. A first wrap fastener comprising a hook and loop fastener strip **432** stitched to the outer side of the border portion **414** and a strip **434** of the same length but smaller width stitched to the inner side of the other border portion **416** provide for fastening these border portions together in overlapping relationship at a location above the heel opening **422** whereby an upper region of the pouch **406** is adapted to be held against the ankle with an adjustable tension force in this wrap fastener. A second wrap fastener of shorter length comprising a hook and loop fastener strip **436** stitched to the outer side of the border portion **414** and a strip **438** of the same length but smaller width stitched to the inner side of the other border portion **416** provide for fastening these border portions together in overlapping relationship at a location below the heel opening **422** whereby a lower region of the pouch **406** is adapted to be held against the ankle with an adjustable tension force in this wrap fastener that is independent of that applied by the other wrap fastener comprising the hook and loop fastener strips **432** and **434**.

The ankle wrap is firmly held in place at a location above the ankle by an independently applied tension force provided by an elastic cinch strap **440** that is stitched at one end to the upper outer corner of the elastic border portion **416** and is of sufficient length to wrap about the lower leg region of a person at a location above the ankle. A cinch strap fastener is provided for fastening the cinch strap **440** to the upper transverse edge of the pouch after the cinch strap has been wrapped about the lower leg region and comprises a hook and loop fastener strip **442** and patch **444**. The cinch strap fastener strip **442** extends along the length of and is stitched to the outer side of an upper transverse margin of the outer cloth member **404** of the pouch **406** and the cinch strap fastener patch **444** is stitched to the inner side of the distal end of the cinch strap **440**. The cinch strap fastener strip **442** and patch **444** thus provide for fastening the cinch strap **440** so as to press the top of the pouch against the lower leg region at a location above the ankle with an adjustable tension force in the cinch strap fastener that is independent of that applied by either of the two wrap fasteners **432,434** and **436,438**. The fastener strips are relatively inelastic and the stitching of the cinch strap fastener strip **442** to the top margin of the outer pouch panel **404** thus renders the latter relatively inelastic which is used to advantage in compressing the pouch against the ankle with a tensioning strap independent of the cinch strap and wrap fasteners as will now be described.

Further control or adjustment of the pressure of the thermal pouch against the ankle in addition to that provided by the single cinch strap and the two wrap fasteners is provided by an elastic tension strap **450**. The tension strap **450** is stitched at one end to the outer side of the lower outer corner of the border **416** over the wrap fastener strip **438** that is located on the inner side. The tension strap **450** is provided with a length sufficient to extend diagonally across and over the pouch **406** to the upper transverse edge of the pouch as seen in FIG. **15**. The tension strap **450** is adjustably attachable to the upper transverse edge of the outer panel **404** of the pouch by a tension strap fastener comprising a hook and loop fastener patch **452** that is stitched to the inner side of the distal end of the tension strap **450** and fastens to the hook and loop fastener strip **442** that also serves to fasten the cinch strap **440**. The tension strap **450** is thus operatively connected to apply a force pressing the pouch against the ankle that is independent of that applied by both the cinch strap and the two wrap fasteners.

The ankle wrap is initially wrapped about and fastened in place with the two wrap fasteners **432,434** and **436,438** and the cinch strap **440** is then pulled around the lower leg portion and fastened above the ankle to the top of the pocket with the cinch strap fastener **442,444**. The tension strap **450** is then pulled across and to the top of the pouch where it is fastened with the tension strap fastener **442, 452**. And the compression of the pouch on the ankle may then be adjusted as desired by tightening or loosening the cinch strap **440** and the tension strap **450**.

The Shoulder Wrap

An embodiment of the invention for use as a thermal wrap for a shoulder is shown in FIGS. **16–19** and is designated as **500**. The shoulder wrap **500** like in the previously described embodiments includes flexible elastic cloth members or panels that are stitched together so as to co-operatively define a flexible elastic pouch. However, in this thermal wrap application there are provided two outer panels **502** and **504** that are stitched to a single inner panel **506** to form a double pouch **508** having a front compartment **510** with an opening **511** for receiving a thermal medium and an adjoining rear compartment **512** with an opening **513** for receiving another thermal medium. The thermal mediums are retained in the compartments by hook and loop fastener strips **514** and **516** that are stitched to the inner side of the top of the respective compartment outer panels **502** and **504** and fasten to a common hook and loop fastener strip **518** stitched to the

inner panel **506** to close the respective openings **511** and **513**.

The shoulder wrap **500** is secured in place with two cinch straps **520** and **522** and is adapted to be draped over either shoulder of a person as illustrated in FIG. **19** with the front pouch compartment **510** always located at the front of the person and the rear pouch compartment **512** always located at the rear so as to position the cinch straps for quick and easy fastening of the shoulder wrap in place as will become more clear from the arrangement and fastening of the cinch straps **520** and **522**. The cinch straps **520** and **522** are identical and are stitched at one end to the respective lower corners of the rear pouch compartment **512** and adjustably fasten to the front pouch compartment to hold the wrap in place.

The fasteners for the cinch straps comprise a hook and loop fastener strip **530** and patch **532** that are stitched to the inner side of the cinch strap **520**, a hook and loop fastener strip **534** and patch **536** that are stitched to the inner side of the other cinch strap **522** in the same relative locations, and a hook and loop fastener strip **538** that extends along the lower edge and is stitched to the outer side of the front compartment panel **502** along a lower margin thereof. The cinch strap fastener strip **538** on the front pouch compartment is common to all the cinch strap fasteners as it forms one of the two parts of each of the fasteners that adjustably connect the cinch straps to the pouch to hold the latter against the shoulder with adjustable tension forces as will now be described.

The fastener parts **530** and **534** are located at the distal ends of the respective cinch straps **520** and **522** and provide for fastening their respective cinch strap to the cinch fastener part **538** on the front pouch compartment when this cinch strap is wrapped or looped about the torso as described below. The other cinch fastener parts **532** and **536** on the cinch straps are located at an intermediate position on the cinch straps and provide for fastening their respective cinch strap to the cinch fastener part **538** on the front pouch compartment when this cinch strap is wrapped or looped about an arm as described below.

The cinch straps are of a sufficient length so that when the wrap **500** is for example draped over the right shoulder as seen in solid line in FIG. **19**, the cinch strap **522** (which then may be referred to as the inside strap) is arrangeable to wrap over a relatively long length thereof in a looping direction partially about the torso of the person from the lower left corner of the rear pouch compartment **512** to the lower transverse edge of the front pouch compartment **510** where it is fastened with its distal fastener part **534** to the fastener part **538** on the front pouch compartment in a leftward location. And the other strap **520** (which may then be referred to as the outside strap) is then arrangeable to wrap over a relatively short length thereof partially about (under) the right arm of the person from the lower right corner of the rear pouch compartment to the lower edge of the front pouch compartment where it is fastened with its intermediately located fastener part **536** to the fastener part **538** on the front pouch compartment in a rightward location.

Alternatively, when the wrap **500** is draped over the left shoulder as shown in phantom line in FIG. **19**, the cinch strap **520** is then the inside strap and is arrangeable to wrap over a relatively long length thereof in a looping direction partially about the torso of the person from the lower right corner of the rear pouch compartment to the lower edge of the front pouch compartment where it is fastened with its distal fastener part **530** to the fastener part **538** on the front pouch compartment in a rightward location. And the other strap **522** which is then the outside strap is then arrangeable to wrap over a relatively short length thereof partially about (under) the left arm from the lower left corner of the rear pouch compartment to the lower edge of the front pouch compartment where it is fastened with its fastener part **536** to the fastener part **538** on the front pouch compartment in a leftward location.

With the wrap **500** thus fastened in place on either shoulder, it will be appreciated that the outside cinch strap applies tension to press the wrap against the shoulder in the area adjacent the adjoining arm while the inside cinch strap applies tension independent of the outside strap to press the wrap against the shoulder in the area adjacent the neck. And these pressure forces can thus be readily adjusted independently of each other with the cinch strap fasteners while the wrap remains in place on the shoulder.

It will also be appreciated that in applying the wrap **500** to either shoulder, a person may conveniently with one hand pull the inside cinch strap from behind and about his or her body and secure this strap in place with the appropriate fastener (e.g. strap **520** and fastener parts **530** and **538**) and then with this same hand pull the outside cinch strap from behind and under the arm adjoining the affected shoulder and secure this strap in place with the appropriate fastener (e.g. strap **522** and fastener parts **536** and **538**). With the wrap thus securely held in place, the person may then quickly and easily adjust the tension by tightening or loosening the straps at the front pouch compartment with the cinch strap fasteners until the desired compression is achieved pressing the wrap against the shoulder.

Conclusion

A thermal wrap has been described which can be realized in various embodiments and which is useful for many applications. It embodies new structural arrangements and principles of operation which provide great improvement over the prior art thermal wraps.

Although the description of this invention has been given with reference to a particular embodiment, it is not to be construed in a limiting sense. Many variations and modifications of the invention will now occur to those skilled in the art. For a definition of the invention, reference is made to the appended claims.

What is claimed is:

1. A thermal ankle wrap for application to an ankle of a person, comprising: first and second flexible elastic cloth members co-operatively defining a flexible elastic pouch adapted to receive a thermal medium and be wrapped about a lower leg region and an ankle and an upper foot region of a person, one of said cloth members including a first flexible elastic border portion extending along one lateral side of said pouch and a second flexible elastic border portion extending along an opposite lateral side of said pouch, said border portions adapted to be brought together in an overlapping relationship at a first location behind said lower leg region and at a second location under said upper foot region when said pouch is wrapped about said lower leg region and said ankle and said upper foot region, a gap in each of said border portions, said gaps co-operatively defining an opening in said border portions between said first and second locations adapted to receive the heel of said foot when said border portions are brought in to said overlapping relationship at said first and second locations, a first wrap fastener for fastening said border portions together in said overlap-

ping relationship at said first location whereby an upper region of said pouch is adapted to be held against said ankle with an adjustable tension force in said first wrap fastener, a second wrap fastener for fastening said border portions together in said overlapping relationship at said second location whereby a lower region of said pouch is adapted to be held against said ankle with an adjustable tension force in said second wrap fastener independent of that applied by said first wrap fastener, an elastic cinch strap secured to an upper corner of one of said border portions and adapted to wrap about said lower leg region at a location above said ankle, a cinch strap fastener for fastening said cinch strap to an upper transverse margin of said pouch after said cinch strap has been wrapped about said lower leg region, said cinch strap fastener having first and second parts, said first part secured to said upper transverse margin of said pouch along the length thereof, said second part secured to said cinch strap and adapted to fasten to said first part whereby said cinch strap is adapted to hold said upper transverse margin of said pouch against said lower leg region at a location above said ankle with an adjustable tension force independent of that applied by said first and second wrap fasteners, an elastic tension strap secured to one of said border portions at a location below the gap in this said one border portion and adapted to extend diagonally across and over said pouch to said upper transverse margin of said pouch, and a tension strap fastener part secured to said tension strap for fastening said tension strap to said first part of said cinch strap fastener whereby said pouch is adapted to be held by said tension strap against said ankle with an adjustable tension force independent of that applied by said wrap fasteners and said cinch strap.

* * * * *

US005507794A

United States Patent [19]

Allen

[11] Patent Number: 5,507,794

[45] Date of Patent: Apr. 16, 1996

[54] THERAPEUTIC SUPPORT GARMENT

[76] Inventor: Patricia A. Allen, P.O. Box 3726, Hayward, Calif. 94541

[21] Appl. No.: 369,787

[22] Filed: Jan. 6, 1995

[51] Int. Cl.[6] A61F 7/00

[52] U.S. Cl. 607/112; 607/114; 126/204; 62/530

[58] Field of Search 607/108, 112, 607/114; 383/901; 126/204; 165/46; 62/530

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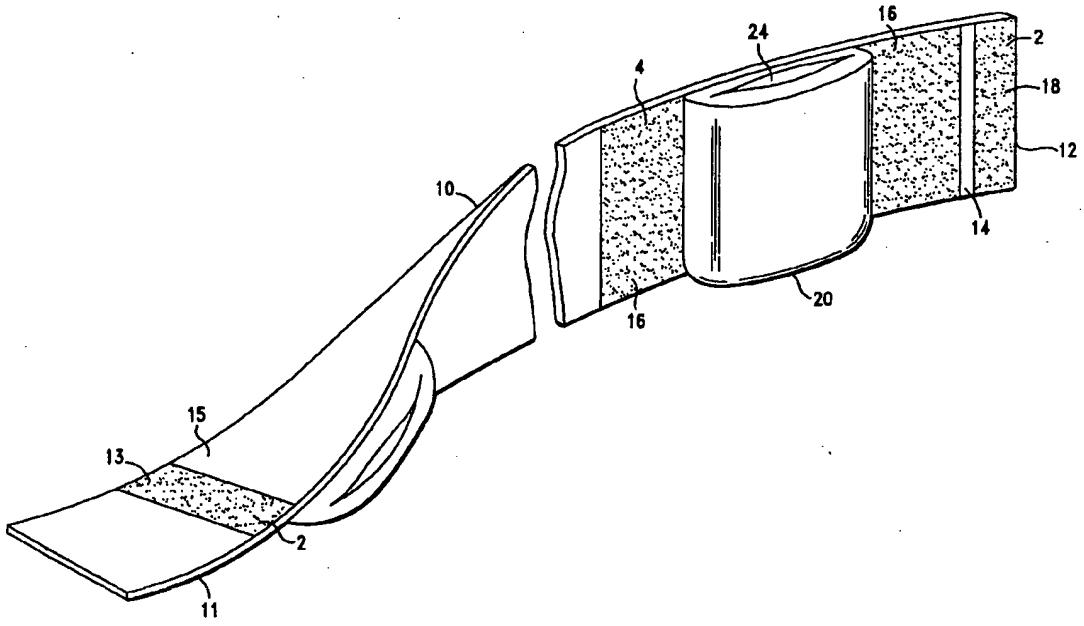
Primary Examiner—Angela D. Sykes
Assistant Examiner—Robert L. Nasser, Jr.
Attorney, Agent, or Firm—Ralph C. Francis

[57] ABSTRACT

Disclosed herein is a therapeutic support garment comprising an elongated support member having two ends, an adjustable securing member for removably securing the support member ends, at least one breast pouch disposed on the support member, a positioning member for removably positioning the breast pouch, and a temperature regulator positioned in the breast pouch for imparting a predetermined temperature to the wearer's breast regions to relieve the discomforts of swelling and tenderness thereof.

11 Claims, 3 Drawing Sheets



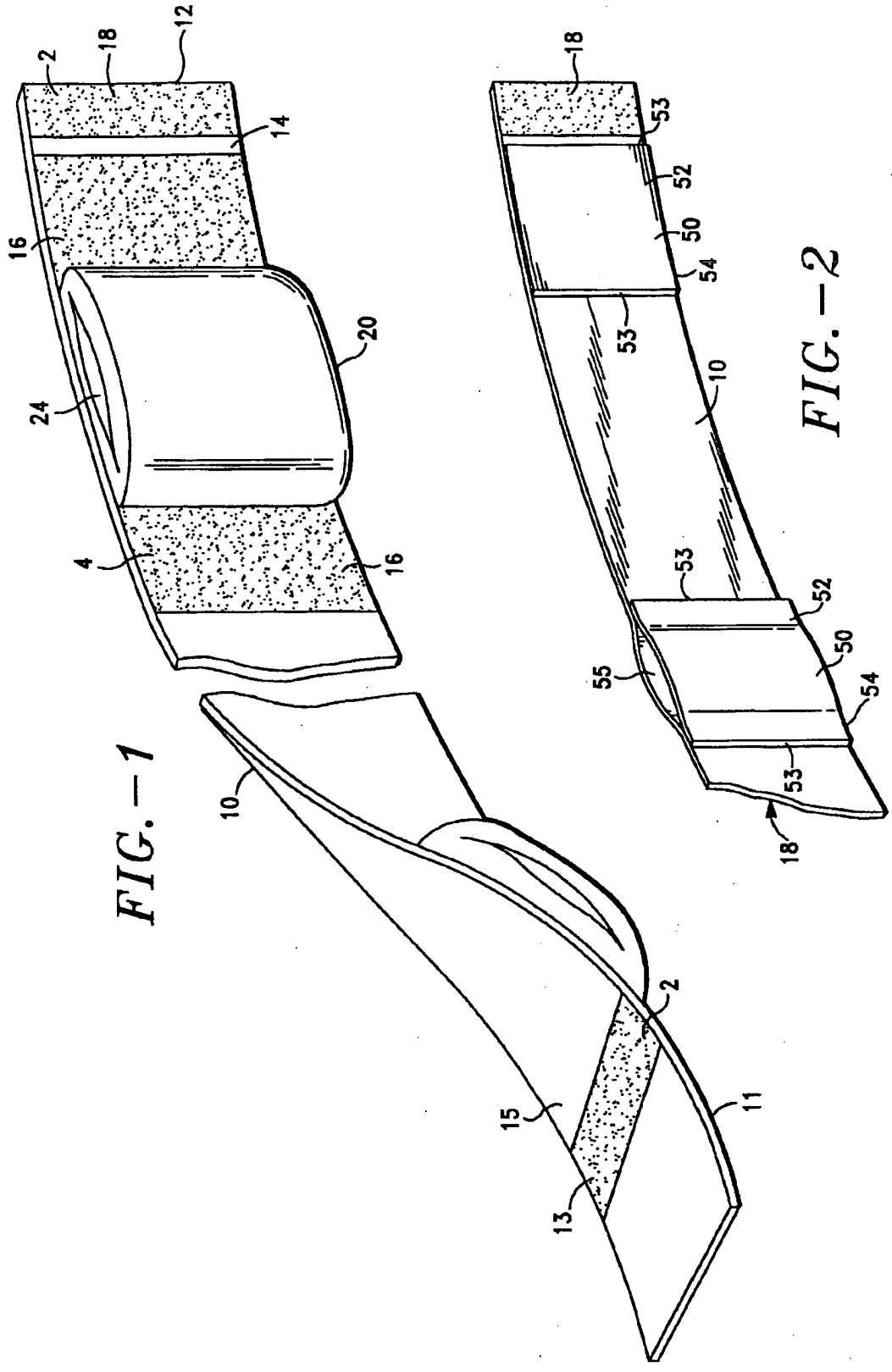

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FIG. -1

FIG. -2

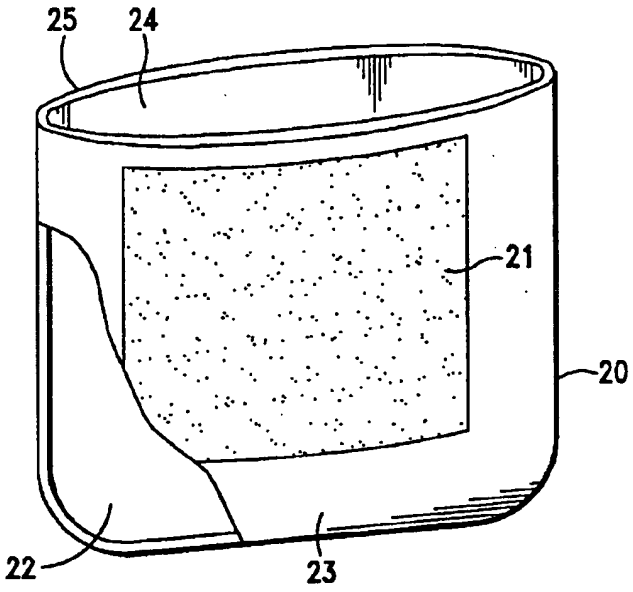

FIG.-3

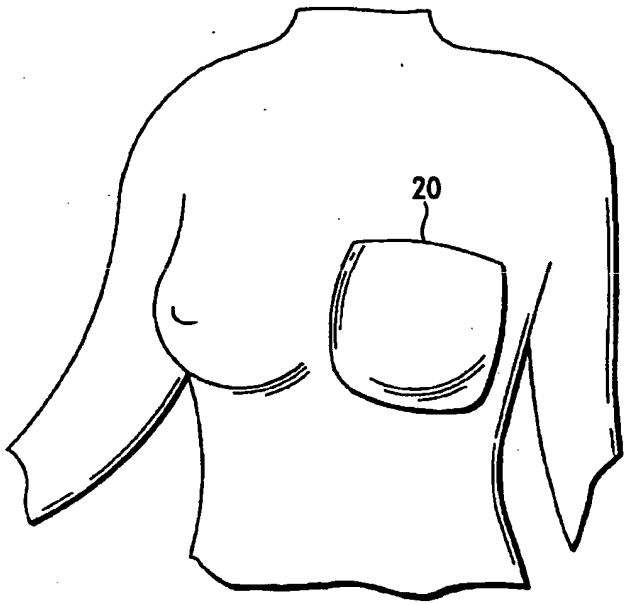

FIG.-4

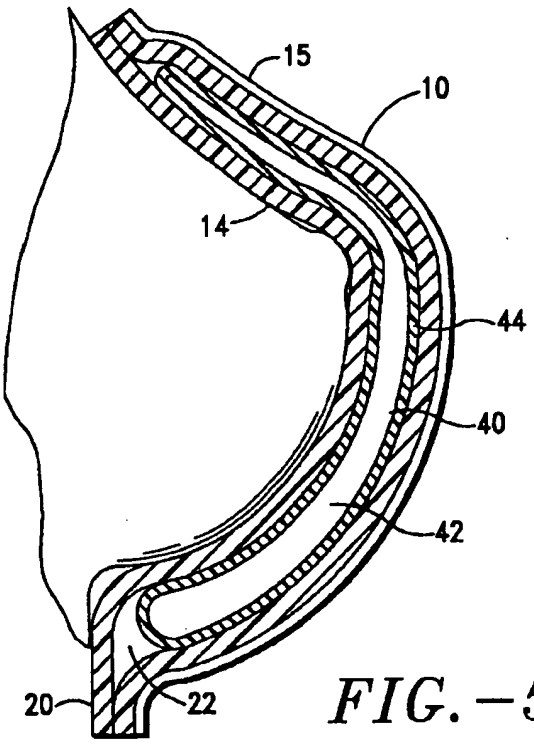

FIG.—5

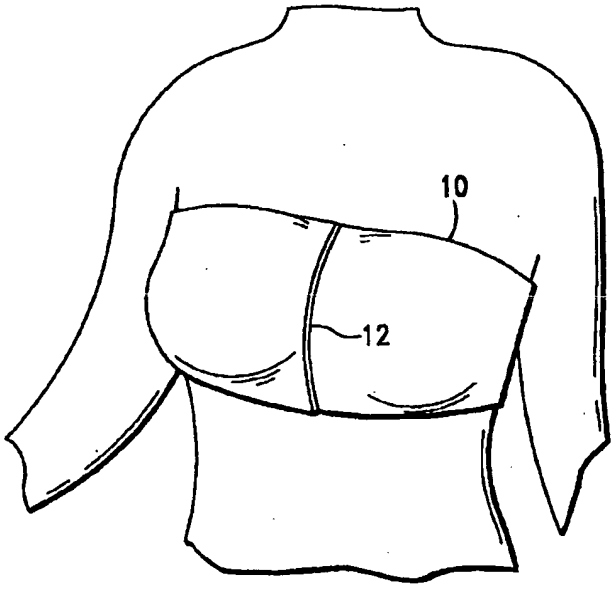

FIG.—6

THERAPEUTIC SUPPORT GARMENT

FIELD OF THE INVENTION

This invention relates generally to therapeutic support garments. More particularly, the invention relates to a therapeutic support garment which readily conforms to the contours of different sized female breasts to provide therapeutic heat or cold to an adjacent breast region to reduce swelling and irritation.

BACKGROUND OF THE INVENTION

During the premenstrual period, pregnancy and the postpartum period, most women suffer the discomforts of swelling (i.e. engorgement)and tenderness of the breasts, nipples and surrounding tissues due to fluid retention or lactation. To alleviate the pain and/or discomfort associated with breast engorgement, doctors generally recommend the application of moist heat (e.g., water compresses, hot showers) to relieve tenderness or cold compresses to reduce swelling. This is, of course, very inconvenient and, in many instances, impractical for a busy nursing mother.

Various thermal heat packs have been employed to provide therapeutic heat to the human body. However, heat packs have many disadvantages. Most significantly, the devices generally include cup shaped portions which do not conform closely to various sizes of the breasts, resulting in uneven application of heat to the breast. Illustrative are the heat packs disclosed in U.S. Pat. Nos. Re: 14,024, 2,298, 361, 3,500,832, 5,050,595 and 5,304,215.

A brassiere capable of providing gentle support of the breast tissues can also help relieve the discomforts associated with breast engorgement. However, brassieres tend to provide an uneven pressure on delicate tissue and can cause greater complications. Illustrative is the brassiere disclosed in U.S. Pat. No. 5,050,595.

The brassiere disclosed in the above noted patent comprises a pair of breast supporting cups, each with a thermal gel pack placed therein. Although the brassiere facilitates heating or cooling of the breasts, the device has many disadvantages, which include (i) uneven temperature and pressure distribution to a woman's breast region and (ii) limited areas of heating or cooling.

Further, the brassiere requires a multitude of sizes to accommodate the wide range of female breast sizes and shapes. Consequently, it is necessary to provide various sizes of gel packs for the multitude of brassiere sizes.

Therefore, what is needed is a support garment which is capable of providing uniform pressure and therapeutic heat or cold to the breast and adjacent areas to relieve the discomforts of swelling and tenderness in the breast regions.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a simple, pliable, lightweight therapeutic support garment which readily conforms to the contours of any size female breast to provide therapeutic heat or cold to the adjacent breast region.

It is an additional object of this invention to provide such a support garment with adjustable breast pouches to accommodate a wide range of breast sizes and configurations.

It is an additional object of this invention to provide such a support garment which provides an even distribution of temperature and pressure about the breast region.

In accordance with the above objects and those that will be mentioned and will become apparent below, the therapeutic support garment in accordance with this invention comprises:

An elongated support member having two ends, a securing member for removably securing the support member ends, a breast pouch disposed on the support member, and a temperature regulator positioned in the breast pouch for imparting a predetermined temperature, whereby when the support garment is positioned about the upper torso of the wearer heat or cold is applied immediately adjacent said breast pouch.

In a preferred embodiment, the support garment includes a plurality of removable breast pouches and positioning means for positioning the breast pouches on the support member. The adjustable breast pouches facilitate the heating and cooling of (i) various breast sizes and shapes and (ii) adjacent breast regions, including the axillary region.

Thus, the advantages of the present invention are as follows: The therapeutic support garment (i) readily conforms to the contours of the breast regions to provide an even distribution of therapeutic heat or cold, (ii) accommodates a wide range of breast sizes and shapes, and (iii) provides an even distribution of pressure to the breast regions.

BRIEF DESCRIPTION OF THE DRAWINGS

For a further understanding of the objects and advantages of the present invention, reference should be had to the following detailed description, taken in conjunction with the accompanying drawings, in which like parts are given like reference numerals and wherein:

FIG. **1** is a perspective view of a therapeutic support garment according to the invention;

FIG. **2** is a perspective view of a further embodiment of the therapeutic support garment;

FIG. **3** is a perspective view of a breast pouch according to the invention;

FIG. **4** is a plan view of a breast pouch positioned on a female breast according to the invention;

FIG. **5** is a cross-sectional view of a breast pouch employed in the therapeutic support garment shown in FIG. **1**; and

FIG. **6** illustrates the therapeutic support garment shown in FIG. **1** about the upper torso of a wearer.

DETAILED DESCRIPTION OF THE INVENTION

FIG. **1** illustrates, in simplified form, a therapeutic support garment according to the present invention. In a preferred embodiment, the support garment includes an elongated support member **10** and a pair of breast pouches **20**. The support member **10** is preferably wide enough to cover the wearer's breast regions and long enough to accommodate a wide range of upper torso sizes in conjunction with the adjustable securing member, discussed below. By the term "breast region" it is meant to include the breast (or mammary gland) and related chest wall, aereolae, nipple and axillary region.

Although the fabric used to construct the elongated support member **10** according to the invention may be selected from a variety of materials, it is preferred to employ a soft, flexible, elastic material which is capable of stretching in multiple directions. Examples of such materials are Lycra®,

Spandex and Nylon. A support garment made of the noted materials will apply pressure more evenly against the wearer's upper torso for maximum therapeutic effect and comfort.

As illustrated in FIG. 1, the elongated support member **10** includes an adjustable securing member **2** for removably securing the support member ends **11, 12**. The securing member **2** is adapted to accommodate a wide range of upper torso sizes while providing substantially even pressure about the wearer's breast regions. As will be recognized in the art, various adjustable securing members may be employed to achieve the adjustable tensioning of the invention, such as a plurality of appropriately positioned conventional snaps, buttons and hooks.

In a preferred embodiment, the adjustable securing member **2** includes a layer **13** of hook-like material disposed proximate one end **11** of the support member **10** on one side thereof **15**. A layer **18** of fibrous material is also disposed proximate the opposite end **12** of the support member **10** on the opposite side (i.e. inside surface) thereof **14**. The hook-like material in layer **13** is operable to mesh with the fibrous material in layer **18** to form an adjustable attachment therefor. This type of cooperating material is commonly referred to under the trade name Velcro®.

Thus, as the support member **10** is wrapped around the upper torso of the wearer, the two overlapping ends **11, 12** are positioned accordingly to achieve an even distribution of pressure about the wearer's breast regions. (See FIG. **6**.) As will be recognized by one ordinarily skilled in the art, the adjustable securing member **2** of the invention will accommodate a wide range of breast sizes and configurations. This eliminates the need for multiple band sizes and cups as is generally required with conventional brassieres.

As discussed above, a key feature of the invention is the positioning member **4** for removably positioning the breast pouches **20** on the support member **10**. The positioning member **4** thus facilitates the heating and cooling of (i) various breast sizes and shapes, and (ii) adjacent breast regions, including the axillary region. In a preferred embodiment of the invention, the positioning member **4** also includes a layer **16** of fibrous material. As illustrated in FIGS. **1** and **3**, the fibrous layer **16** is generally disposed over a substantial portion of the inside surface **14** of the elongated support member **10** to facilitate a wide range of breast pouch **20** positions. A layer **21** of hook-like material is also disposed on one side **23** of each breast pouch **20** to facilitate attachment to and positioning of the breast pouches **20** on the support member **10**.

Alternatively, the positioning member **4** can comprise a plurality of appropriately positioned snaps, buttons and hooks. As will be recognized by one of ordinary skill in the art, the support member **10** of the invention is adapted to accommodate a wide range of alternative positioning members.

Referring to FIG. **4**, the breast pouches **20** of the invention are designed and configured to accommodate a wide range of breast sizes. According to the invention, each breast pouch **20** is large enough to cover a wearer's breast region. Preferably, the breast pouches **20** are approximately 6 inches wide by 6 inches long.

The breast pouches **20** are preferably composed of a soft, heat-conductive material such as terry cloth or brushed cotton. Of course, other materials, such as Lycra®, nylon and poly-wool blends, can also be used within the scope of this invention.

According to the invention, as illustrated in FIG. **3**, each breast pouch **20** includes an enclosure **22** and an opening **24** communicating with the enclosure **22**. The opening **24** is dimensioned and configured to allow the disposable temperature regulator **40** (discussed below) to be inserted through the opening **24** and positioned in the breast pouch enclosure **22**. The breast pouches **20** can also include securing means, such as Velcro®, snaps or buttons, disposed proximate the opening edge **25**, to secure the temperature regulator **40** in the breast pouch enclosure **22**.

Referring to FIG. **5**, the temperature regulator **40** is positioned in the breast pouch enclosure **22** and configured to envelope the wearer's breast region. In a preferred embodiment, the temperature regulator **40** comprises a conventional thermal gel pack. The gel pack **40** includes a temperature retaining gelatinous medium **42** enclosed within a heat conducting envelope **44**. Typically, the envelope **44** is composed of a flexible plastic film such as polyethylene.

The gel packs **40** may be heated or cooled by conventional means, such as a microwave oven or conventional refrigeration. Although the optimal heating and cooling temperature ranges to achieve maximum therapeutic effect varies with the individual, the inventor has found that the following ranges generally achieve superior therapeutic effects: Heating 105° C. to 115° C.; Cooling 32° to °C. The gel packs **40** should also have the capacity to retain the desired temperature over an extended period of time, preferably, ≦1° C./min.

The heat or cold from the gel packs **40** when positioned in the breast pouches **20** reduces swelling and tenderness of the breast tissues and relieves the discomforts occurring during a woman's premenstrual period, pregnancy and/or the post-partum period. Additionally, due to the unique design and configuration of the invention, the therapeutic support garment may be employed to relieve the discomforts associated with various surgical procedures, such as breast biopsy, lumpectomy, a mastectomy or heart surgery.

Referring to FIG. **2**, there is shown an additional embodiment of the invention wherein the breast pouches **50** are permanently positioned and secured on the support member **10**. In this embodiment, the breast pouches **50** comprise a pair of inner panels **52** secured on the side **53** and bottom **54** edges by conventional means. The panels **52** and support member **10** form between them pockets **55** for receiving the temperature regulator **40**.

In additional embodiments of the invention, not shown, an adjustable tie strap may be employed. The tie strap would provide additional support to the woman's breasts to enhance comfort.

Without departing from the spirit and scope of this invention, one of ordinary skill may make various changes and modifications to the invention to adapt it to various usages and conditions. As such, these changes and modifications are properly, equitably and intended to be, within the full range of equivalence of the following claims.

What is claimed is:

1. A therapeutic support garment kit dimensioned and configured to encircle the upper torso of a wearer, comprising:

an elongated elastic support member having two ends;

a securing member for removably securing said support member ends;

a plurality of breast pouches, each being selectively attachable and detachable to said support member, wherein each breast pouch is of a different size, and wherein at least one of said pouches is attachable to said support member at any given time;

a thermal pack disposed in said breast pouch for imparting a predetermined temperature, whereby when said sup-

port member is positioned about the upper torso of the wearer, heat or cold is applied immediately adjacent said breast pouch.

2. The support garment as set forth in claim 1, wherein said securing member is adjustable to selectively provide a substantially even pressure about the wearer's breast regions.

3. The support garment as set forth in claim 1, wherein said thermal pack is disposable.

4. The support garment as set forth in claim 1, wherein the breast pouch is composed of a heat conductive material.

5. A therapeutic support garment kit dimensioned and configured to encircle the upper torso of a wearer, comprising:

an elongate elastic support member having two ends,

an adjustable securing mechanism disposed on said support member ends;

a plurality of interchangeable breast pouch kits, each kit including multiple breast pouches having an enclosure therein, said breast pouches being selectively attachable and detachable to said support member, wherein each kit includes different sized pouches;

a positioning member for removably positioning said breast pouches on said support member;

a thermal pack disposed in each of said breast pouches for imparting a predetermined temperature to the wearer's breast regions, whereby when said support member is positioned about the upper torso of the wearer, heat or cold is immediately applied adjacent said breast pouches.

6. The support garment as set forth in claim 5, wherein said support member is wide enough to cover the wearer's breast regions.

7. The support garment as set forth in claim 5, wherein said breast pouches are substantially cup shaped.

8. The support garment as set forth in claim 7, wherein said breast pouches are composed of a soft, heat-conductive material.

9. The support garment as set forth in claim 5, wherein each of said breast pouches includes an opening communicating with said breast pouch enclosure, said opening being dimensioned and configured to allow said thermal pack to be inserted through said opening and positioned in each of said breast pouch enclosures.

10. The support garment as set forth in claim 5, wherein said thermal pack is disposable.

11. The support garment as set forth in claim 10, wherein said thermal pack comprises a thermal gel pack.

* * * * *

US005906637A

United States Patent [19]

Davis et al.

[11] Patent Number: 5,906,637

[45] Date of Patent: May 25, 1999

[54] **DISPOSABLE ELASTIC THERMAL UNIAXIAL JOINT WRAP**

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[73] Assignee: **The Procter & Gamble Company**, Cincinnati, Ohio

[21] Appl. No.: **08/916,083**

[22] Filed: **Aug. 21, 1997**

[51] **Int. Cl.**[6] **A61F 7/00**

[52] **U.S. Cl.** **607/108**; 607/108; 607/112; 607/114; 607/111; 165/46; 126/204

[58] **Field of Search** 165/46; 607/108–114; 383/901; 126/204

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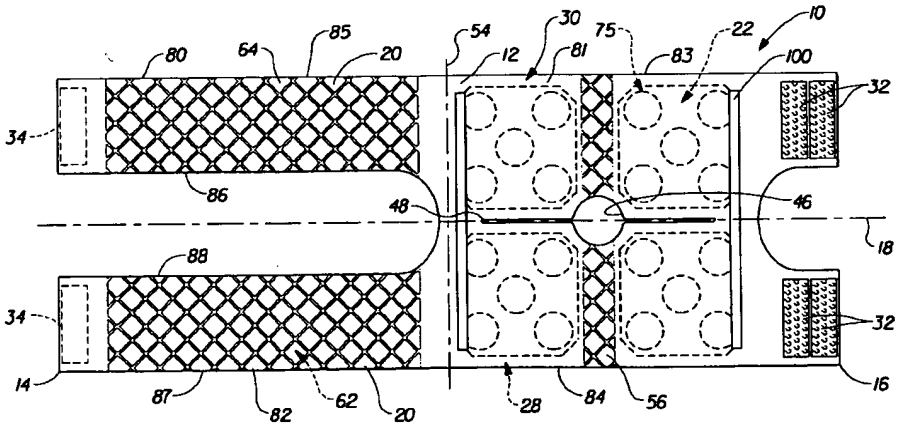
Primary Examiner—Bob Nasser
Assistant Examiner—Michael Astorino
Attorney, Agent, or Firm—Douglas C. Mohl; Loy M. White; T. David Reed

[57] **ABSTRACT**

The present invention relates to disposable elastic thermal uniaxial joint wraps having an elastic laminate structure formed from a polymeric mesh and two fabric carrier layers, and one or more heat cells, preferably one or more thermal packs comprising a plurality of individual heat cells, wherein heat is applied to specific areas of the user's body, preferably for the knee and/or elbow, preferably for pain relief. These wraps provide good conformity to user's body to deliver consistent, convenient and comfortable heat application.

36 Claims, 5 Drawing Sheets



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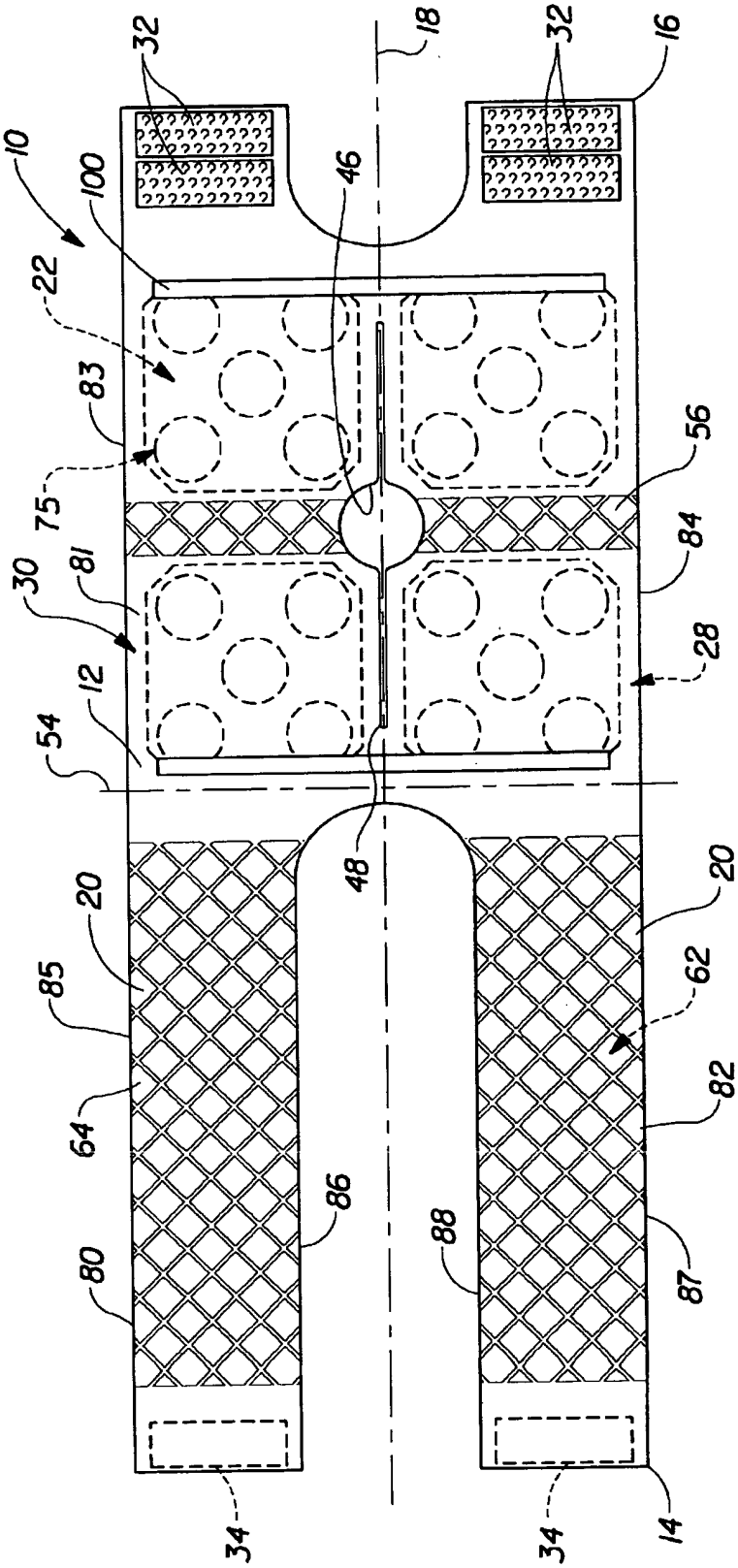
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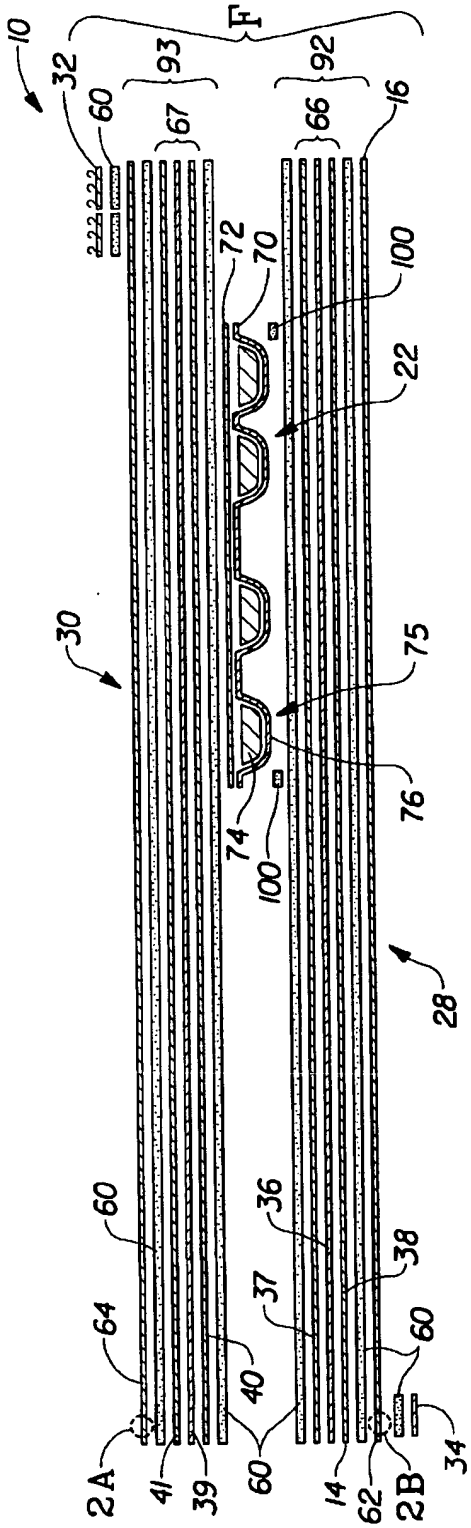
Fig. 1

Fig. 2



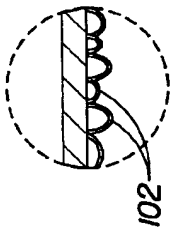


Fig. 2B

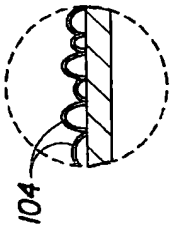


Fig. 2A

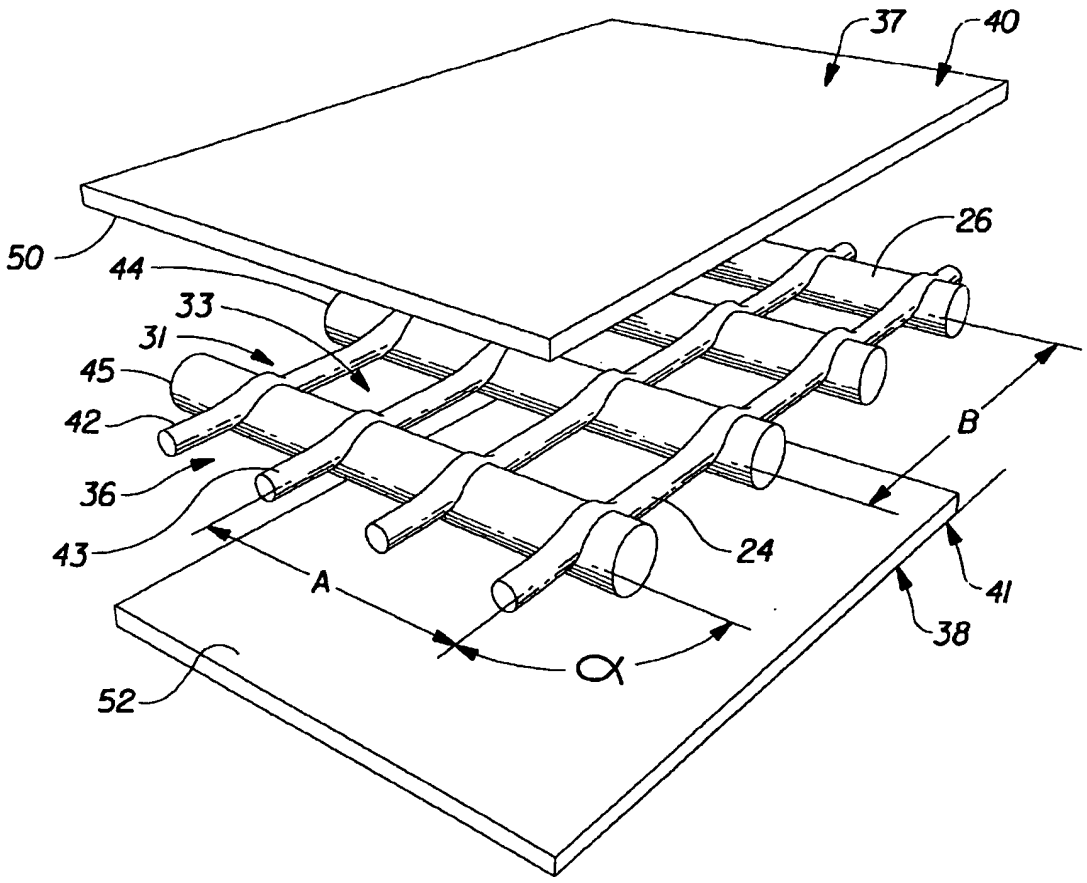


Fig. 3

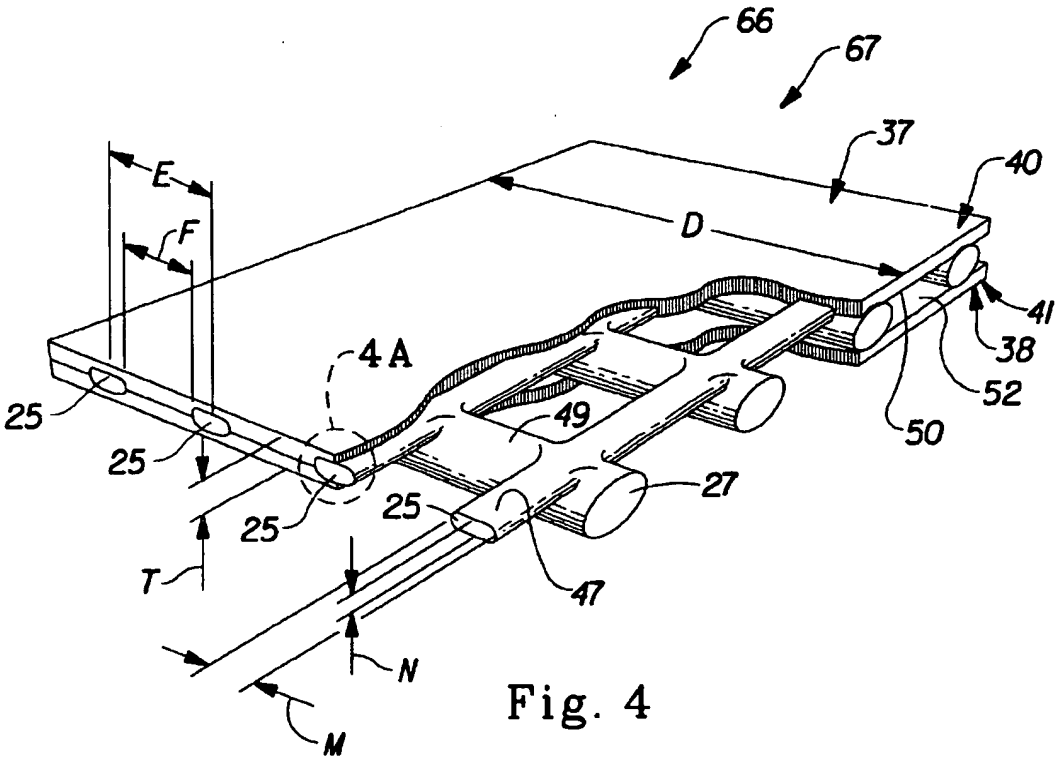

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Fig. 4

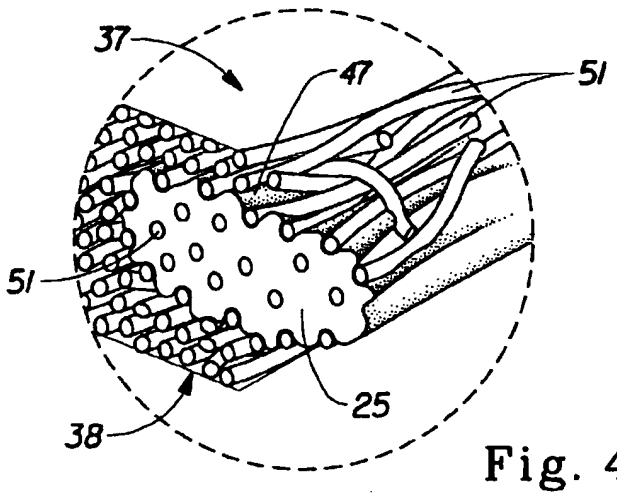
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Fig. 4A

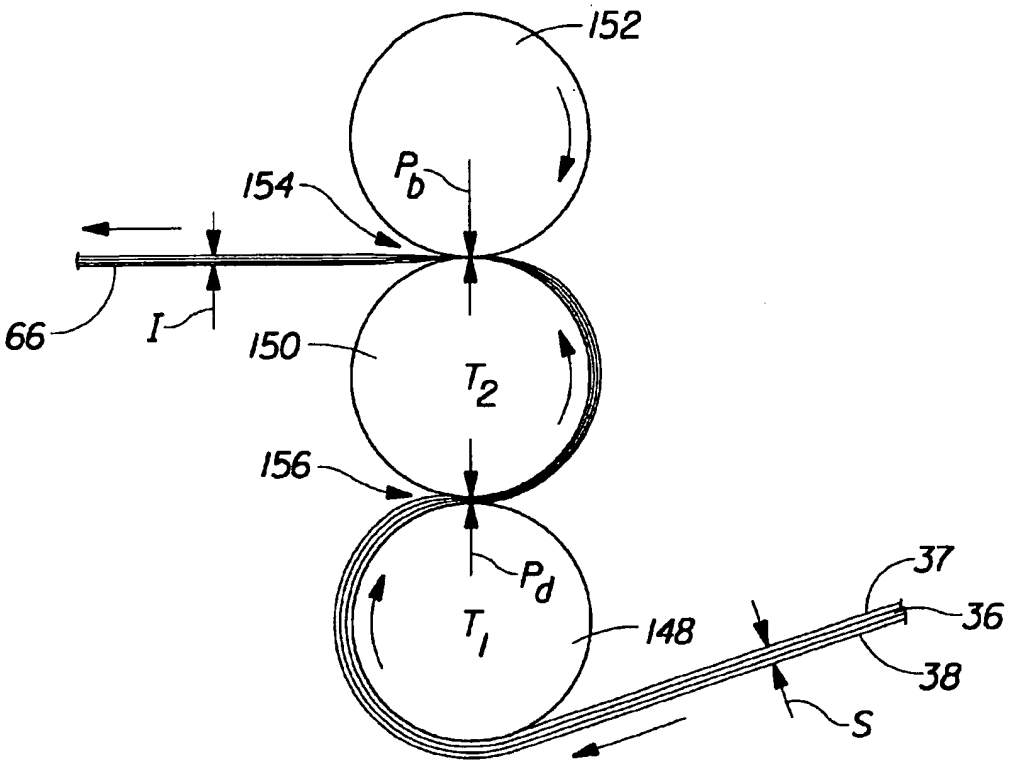
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Fig. 5

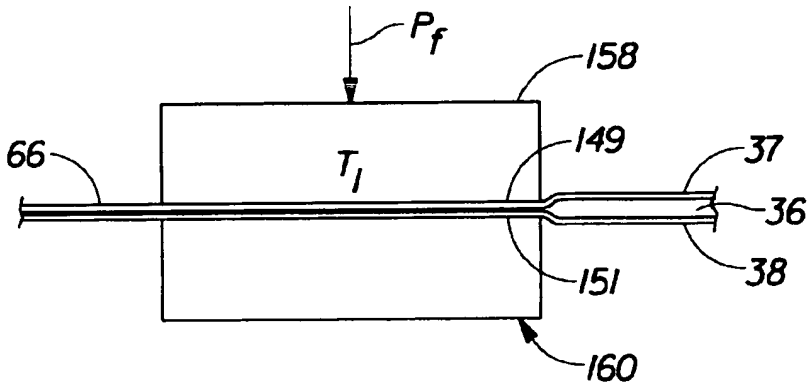
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Fig. 6

DISPOSABLE ELASTIC THERMAL UNIAXIAL JOINT WRAP

TECHNICAL FIELD

The present invention relates to disposable elastic thermal uniaxial joint wraps having an elastic laminate structure formed from a polymeric mesh and two fabric carrier layers, and one or more heat cells, such that heat is applied to specific areas of the user's body, preferably for pain relief. More particularly, the present invention relates to disposable elastic thermal uniaxial joint wraps, preferably for the knee and/or elbow, having an elastic laminate structure and one or more thermal packs comprising a plurality of individual heat cells providing good conformity to user's body to deliver consistent, convenient and comfortable heat application.

BACKGROUND OF THE INVENTION

A common method of treating temporary or chronic pain is by application of heat to the afflicted area. Such heat treatments are used as a means of therapy for conditions which include aches, stiffness in muscles and joints, nerve pain, rheumatism and the like.

The human knee and elbow are two of the most vulnerable joints of the human body to overstress injury. While elastic compression bandages have been used to help stabilize knee movement during injury healing, heating pads, whirlpools, hot towels, and hydrocollators have been commonly used to apply heat to the knee to relieve the pain of knee injury. These pain relieving and stabilization devices, however, typically provide either one function or the other, but not both.

In general, the beneficial therapeutic effects from the administration of heat diminish after the heat source is removed. Therefore, depending on the temperature, it is desirable to provide a sustained heat source to the afflicted area for as long as possible to achieve the desired therapeutic benefits. Many of the current heating devices which require the thermal source to be replenished, such as the devices mentioned above or those employing reusable thermal packs containing water and/or microwaveable gels, are inconvenient to use on a regular and extended basis because the heat energy may not be immediately available when needed or released in a controllable manner.

Disposable heat packs based on iron oxidation, such as those described in U.S. Pat. Nos. 4,366,804, 4,649,895, 5,046,479 and Re.32,026, have been developed, however, such devices have proven not totally satisfactory. Many of these devices are bulky, cannot maintain a consistent and controlled temperature, and/or have unsatisfactory physical dimensions which hinder their effectiveness, and hence, deliver inconsistent, inconvenient and/or uncomfortable heat application to the body.

Proper positioning of the thermal energy also may not be maintainable during knee or elbow flexure with current heating devices. Elastic laminate structures have previously been used in a variety of products including elastic absorbent structures such as sweat bands, bandages, diapers, and incontinence devices. Several methods for producing these laminate structures, such as those disclosed in U.S. Pat. Nos. 4,522,863, 4,606,964, and 4,977,011, also currently exist. However, while these elastic laminate structures may be suitable for the purposes for which they were intended, they have strands which protrude on cut sides of the structure such that they can be a source of irritation when worn next to the body. Further, if an elastic laminate structure having a large modulus value (i. e., the ratio of stress to strain) is desired, elastic strands having a large cross-sectional area are generally required. Large strands of this type, however, can produce a rough or "nubby" feeling when placed in contact with the body.

The present inventors have developed disposable elastic thermal uniaxial joint wraps which maintain proper positioning during use on a user's knee or elbow while providing both compression and thermal energy in a controlled and sustainable manner. These wraps comprise one or more thermal bonded elastic laminate structures, which preferably comprise two carrier layers and an elastic member integrally thermal bonded therebetween, and one or more heat cells, preferably one or more thermal packs, wherein each thermal pack comprises a plurality of individual heat cells, which typically comprise an exothermic composition, preferably comprising a specific iron oxidation chemistry and specific physical dimensions and fill characteristics, spaced apart and fixedly attached across the thermal pack. The thermal bonded elastic laminate structures, when incorporated into the knee and/or elbow wraps of the present invention, substantially reduce delamination of the composite structure of the wraps during use, substantially reduce the rough and "nubby" feeling and irritation caused by strands protruding from cut edges, and provide the knee and/or elbow wraps with excellent conformity to the user's knee and/or elbow for uniform heat coverage and enhanced comfort.

It is therefore an object of the present invention to provide disposable elastic uniaxial joint wraps having excellent conformity to the user's knee and/or elbow for uniform heat coverage and enhanced comfort, which comprise one or more thermal bonded elastic laminate structures and one or more heat cells, which provide a controlled and sustained temperature and which reach their operating temperature range relatively quickly.

It is a further object of the present invention to provide disposable elastic uniaxial joint wraps, which comprise one or more thermal bonded elastic laminate structures, which comprise two carrier layers and an elastic member integrally bonded therebetween and one or more thermal packs comprising a plurality of individual heat cells. Such elastic laminate structures substantially reduce delamination of the composite structure of the wraps, substantially reduce the rough or "nubby" feeling and irritation caused by strands protruding from cut edges, and provide consistent, convenient, and comfortable heat application while deterring easy access to the heat cell contents.

It is a still further object of the present invention to provide disposable elastic uniaxial joint wraps, preferably for the knee and/or elbow, which comprise one or more thermal bonded elastic laminate structures, which preferably comprise two carrier layers and an elastic member integrally bonded therebetween, and one or more thermal packs having a unified structure of at least one continuous layer of semirigid material, which has different stiffness characteristics over a range of temperatures, and a plurality of individual heat cells, spaced apart and fixedly attached across the unified structure of the thermal pack providing good overall drapability while maintaining sufficient rigidity to maintain structural support of the heat cells and to prevent unacceptable stretching of the continuous layer or layers during processing or use.

These objectives and additional objectives will become readily apparent from the detailed description which follows.

SUMMARY OF THE INVENTION

The disposable elastic thermal uniaxial joint wraps of the present invention, comprise a piece of flexible material

having an outer surface, a body-facing surface, a first end, a second end, a body portion, a first strap portion, a second strap portion, wherein at least one of body portion, first strap portion, and second strap portion comprise an elastic portion stretchable along a longitudinal axis of the piece of flexible material, and one or more heat cells comprising an exothermic composition, which preferably substantially fills the available cell volume within the cell.

The elastic portion of the flexible material comprises a laminate structure having a first carrier layer, a second carrier layer, and a mesh disposed between the first and second carrier layers. The mesh is preferably elastic in at least one direction and comprises a plurality of first strands intersecting a plurality of second strands, wherein first and second strands have softening temperatures, at an applied pressure, such that at least 10% of first strands are integrally bonded to first and second carrier layers by application of a bonding pressure at the softening temperature of the first strands.

The piece of flexible material has a length great enough to encircle a user's knee and/or elbow such that the first and second ends overlap when the flexible material is in a relaxed or stretched state. The first and second ends comprise a reclosable fastening means, preferably a hook and loop fastening system, for attaching the first end to said piece of flexible material in order to hold said piece of flexible material around the user's knee or elbow. More preferably, the fastening means comprises a two-part fastening means which additionally comprises a plurality of hook members which engage loop fibers of a landing zone attached to, or part of, the piece of flexible material in order to adjust the wrap to a variety of user sizes and to attain a comfortable level of elastic tension.

The piece of flexible material preferably comprises an aperture therein intended to be aligned with the user's patella (knee) or olecranon (elbow) to establish a convenient locating point for wrapping the uniaxial joint wrap around the user's knee or elbow. The piece of flexible material preferably comprises a slit extending substantially longitudinally from the aperture for enabling the piece of flexible material to stretch transverse to the longitudinal axis at the aperture in order to accommodate bending of the user's knee or elbow.

The elastic thermal uniaxial joint wraps preferably comprise one or more thermal packs, preferably embedded in the piece of flexible material, to apply thermal energy to the user's knee or elbow. The thermal pack or packs comprise a unified, structure comprising at least one continuous layer of a coextruded film, preferably comprising a first side of polypropylene and a second side comprising a low melt temperature polymer, which has different stiffness characteristics over a range of temperatures. The thermal pack or packs further comprise a plurality of individual heat cells which provide a controlled and sustained temperature and which reach their operating temperature range quickly. The heat cells are spaced apart and fixedly attached within each thermal pack. Each thermal pack provides good drapability while maintaining sufficient rigidity to maintain structural support of the heat cells and to prevent unacceptable stretching of the continuous layer or layers during processing or use, providing consistent, convenient and comfortable heat application. Preferably, the heat cells comprise a mixture of powdered iron, powdered carbon, water, and metal salt, which when exposed to oxygen, provides heat for several hours.

The present invention further comprises methods for making disposable elastic thermal uniaxial joint wraps, wherein the elastic laminate structure is formed prior to assembly of the flexible material and comprises the steps of:

a) providing a first carrier layer;

b) providing a second carrier layer;

c) providing a mesh disposed between the first and second carrier layers, having a plurality of first strands intersecting a plurality of second strands, the first and second strands having softening temperatures at an applied pressure, wherein the softening temperature of the second strands, at the applied pressure, is greater than the softening temperature of the first strands at the applied pressure;

d) heating the mesh to the softening temperature of first strands and less than the softening temperature of the second strands;

e) applying a bonding pressure to the first strands; and

f) integrally bonding from about 10% to about 100% of the first strands to the first and second carrier layers.

All percentages and ratios used herein are by weight, and all measurements made at 25° C., unless otherwise specified.

BRIEF DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims which particularly point out and distinctly claim the present invention, it is believed that the present invention will be better understood from the following description of preferred embodiments, taken in conjunction with the accompanying drawings, in which like reference numerals identify identical elements and wherein:

FIG. 1 is a top plan view of a preferred embodiment of the present invention, showing the preferred pattern of heat cells and/or thermal pack(s);

FIG. 2 is a sectioned side elevation view of FIG. 1, disclosing the laminate structure of the present invention;

FIG. 3 is an exploded view of a mesh and first and second carrier layer prior to being formed into a laminate structure, made in accordance with the present invention;

FIG. 4 is a partial perspective view of a laminate structure made in accordance with the present invention, wherein a portion of the carrier layers have been removed to show the integrally bonded first strands;

FIG. 4A is an enlarged partial perspective view of an integrally bonded first strand of the laminate structure of FIG. 4;

FIG. 5 is a schematic representation of a preferred process according to the present invention for forming the laminate structure of FIG. 4; and

FIG. 6 is a schematic representation of a plate process according to the present invention for forming the laminate structure of FIG. 4.

DETAILED DESCRIPTION OF THE INVENTION

The disposable elastic thermal uniaxial joint wraps of the present invention comprise at least one elastic portion of flexible material having at least one elastic laminate structure, wherein the laminate structure comprises at least one elastic member integrally thermal bonded between a first carrier layer and second carrier layer, and at least one heat cell. Preferably the disposable elastic thermal knee wrap of the present invention comprises at least one elastic laminate structure and one or more thermal packs having at least one continuous layer of a material, which exhibits specific thermophysical properties and a plurality of indi-

vidual heat cells spaced apart and fixedly attached across the thermal pack, providing good overall drapability while maintaining sufficient rigidity to maintain structural support of the heat cells and to prevent unacceptable stretching of the continuous layer or layers during processing or use. The disposable elastic thermal uniaxial joint wrap of the present invention, provides consistent, convenient, and comfortable heat application, and an excellent conformity to the user's knee or elbow, while retaining sufficient rigidity to deter easy access to the heat cell contents.

The term "disposable", as used herein, means that, while the elastic thermal wraps of the present invention may be stored in a resealable, substantially air impermeable container and reapplied to the user's body as often as required for the relief of pain, they are intended to be thrown away, i. e., deposited in a suitable trash receptacle, after the heat source, i. e., the heat cell(s) or thermal pack(s), has been fully expended.

The term "heat cells", as used herein, means a unified structure, comprising an exothermic composition, preferably a specific iron oxidation chemistry, enclosed within two layers, wherein at least one layer may be oxygen permeable, capable of providing long lasting heat generation with improved temperature control, and having specific physical dimensions and fill characteristics. These heat cells can be used as individual heating units, or in a thermal pack comprising a plurality of individual heat cells which can also be easily incorporated into disposable body wraps, pads, and the like. Body wraps incorporating heat cells or thermal packs adapt to a wide variety of body contours, thus providing consistent, convenient, and comfortable heat application.

The term "direct compaction", as used herein, means a dry powder mixture is blended, compressed, and formed into pellets, tablets, or slugs without the use of typical wet binders/solutions to adhere the particulate(s) together. Alternatively, the dry powder mixture is blended and roll compacted or slugged, followed by milling and screening, creating directly compacted granules. Direct compaction may also be known as dry compaction.

The term "fill volume", as used herein, means the volume of the particulate composition or the compacted, water-swelled, heating element in the filled heat cell.

The term "void volume", as used herein, means the volume of the cell left unfilled by the particulate composition or the compacted heating element in a finished heat cell.

The term "cell volume", as used herein, means the fill volume plus the void volume of the heat cell.

The term "continuous layer or layers", as used herein, means one or more layers of a material which may be uninterrupted or partially, but not completely, interrupted by another material, holes, perforations, and the like, across its length and/or width.

The term "semirigid material", as used herein, means a material which is rigid to some degree or in some parts and exhibits a toughness to maintain structural support of the heat cells in an unsupported format, and/or to prevent unacceptable stretching of structures of the material during processing or use and/or to deter easy access to the heating element contents while still maintaining good overall drape characteristics when heated.

Referring now to the drawings, and more particularly to FIGS. **1** and **2**, there is shown a preferred embodiment of the present invention, which provides a disposable elastic thermal uniaxial joint wrap, and is generally indicated as **10**. Wrap **10** comprises a piece of flexible material **12** having a longitudinal axis **18**.

Flexible material **12** comprises a first end **14** and a second end **16**, a body portion **81**, and preferably a first strap portion **80** and second strap portion **82**, wherein at least one of body portion **81**, first strap portion **80**, and second strap portion **82** comprise elastic portion **20** capable of being stretched along longitudinal axis **18**. Flexible material **12** has a length, when in a relaxed or stretched state, as measured in a direction parallel to longitudinal axis **18** from first end **14** to second end **16**, which is great enough to encircle a user's knee or elbow such that first end **14** overlaps second end **16**. Flexible material **12** has a body-facing material **62**, comprising body-facing surface **28**, and an outer surface material **64**, comprising outer surface **30**, extending from first end **14** to second end **16**.

As used herein, "elastic" refers to that property of a material whereby the material, when subjected to a tensile force, will stretch or expand in the direction of the force and will essentially return to its original untensioned dimension upon removal of the force. More specifically, the term "elastic" is intended to mean a directional property wherein an element or structure has a recovery to within about 10% of its original length Lo after being subjected to a percent strain $\epsilon_{\%}$ of greater than 50%. As used herein, percent strain $\epsilon_{\%}$ is defined as:

$$\epsilon_{\%}=[(L_f-L_o)/L_o]*100$$

Where

L_f=Elongated Length

L_o=Original Length

For consistency and comparison, the recovery of an element or structure is preferably measured 30 seconds after release from its elongated length L_f. All other elements or structures will be considered inelastic if the element or structure does not recover to within about 10% of its original length L_o within 30 seconds after being released from a percent strain $\epsilon_{\%}$ of 50%. Inelastic elements or structures would also include elements or structures which fracture and/or permanently/plastically deform when subjected to a percent strain $\epsilon_{\%}$ of 50%.

Referring now to FIGS. **1–4**, elastic portion **20** of flexible material **12** comprises a first elastic member **36**. First elastic member **36** is preferably thermally bonded to first carrier layer **37** and second carrier layer **38** prior to assembly of flexible material **12** to form first thermal bonded elastic laminate **66**. First thermal bonded elastic laminate **66** is then fixedly attached to body-facing material **62**, by hot melt adhesive layer **60** to form body-facing laminate **92**.

Preferably, elastic portion **20** of flexible material **12** further comprises a second elastic member **39**. Second elastic member **39** is preferably thermally bonded to third carrier layer **40** and fourth carrier layer **41** prior to assembly of flexible material **12** to form second thermal bonded elastic laminate **67**. Second thermal bonded elastic laminate **67** is then fixedly attached to outer surface material **64**, by hot melt adhesive layer **60** to form outer surface laminate **93**. Body-facing laminate **92** is then fixedly attached to outer surface laminate **93** with one or more individual heat cells **75**, preferably one or more thermal packs **22**, interposed therebetween, by hot melt adhesive layer **60**, to form wrap **10**.

Referring now to FIGS. **3** and **4** elastic members **36** and **39** comprise a plurality of first strands **24** which intersect or cross (with or without bonding to) a plurality of second strands **26** at nodes **31** at a predetermined angle α, thereby forming a net-like open structure having a plurality of apertures **33**. Each aperture **33** is defined by at least two

adjacent first strands (i. e., **42** and **43**) and at least two adjacent second strands (i. e., **44** and **45**) such that apertures **33** are substantially rectangular (preferably square) in shape. Other aperture configurations, such as parallelograms or circular arc segments, can also be provided. Such configurations could be useful for providing non-linear elastic structural directions. It is preferred that first strands **24** are substantially straight and substantially parallel to one another, and, more preferably, that second strands **26** are also substantially straight and substantially parallel to one another. Most preferably, first strands **24** intersect second strands **26** at nodes **31** at a predetermined angle α of about 90 degrees. Each node **31** is an overlaid node, wherein first strands **24** and second strands **26** are preferably joined or bonded (although it is contemplated that joining or bonding may not be required) at the point of intersection with the strands still individually distinguishable at the node. However, it is believed that other node configurations such as merged or a combination of merged and overlaid would be equally suitable.

Although it is preferred that first and second strands **24** and **26** be substantially straight, parallel, and intersect at an angle α of about 90 degrees, it is noted that first and second strands **24** and **26** can intersect at other angles α, and that first strands **24** and/or second strands **26** can be aligned in circular, elliptical or otherwise nonlinear patterns relative to one another. Although for ease of manufacture it is contemplated that first strands **24** and second strands **26** have a substantially circular cross-sectional shape prior to incorporation into laminate structures **66** and/or **67**, first and second strands **24** and **26** can also have other cross-sectional shapes such as elliptical, square, triangular, or combinations thereof.

The material of first strands **24** is chosen so that first strands **24** can maintain second strands **26** in relative alignment prior to forming laminate structures **66** and/or **67**. It is also desirable that the materials of first and second strands **24** and **26** be capable of being deformed (or initially formed) into predetermined shapes upon application of a predetermined pressure or a pressure in combination with a heat flux, as described in more detail hereafter. These deformed shapes (i. e., elliptical second strands, substantially flat first strands and the like) provide laminate structures **66** and **67** which can be comfortably worn about the body without irritation or other discomfort. It is further desirable that the material chosen for first strands **24** provide an adhesive-like property for joining a portion of second strand outer surface **49** of deformed second strands **27** to a portion of first carrier layer inner surface **50** and second carrier layer inner surface **52**.

The material of first strands **24** should also be capable of integrally bonding with carrier layers **37, 38, 40** and/or **41** as part of forming laminate structure **66** and/or **67**. As described in more detail hereafter, first strands **24** can be integrally bonded to carrier layers **37, 38, 40** and/or **41** by application of a pressure or a pressure in combination with a heat flux. As used herein, the phrase "integrally bonded" and its derivatives is intended to mean that a portion of a strand outer surface (i. e., first strand outer surface **47**) of an integrally bonded strand (i. e., integrally bonded first strands **25**) has penetrated into and bonded with carrier layer **37,38, 40**, and/or **41**. The portion of the strand outer surface of an integrally bonded strand which penetrates carrier layer **37, 38, 40**, and/or **41** can bond mechanically (i. e., as by encapsulating, encircling or otherwise engulfing) and/or chemically (i. e., polymerizing, fusing or otherwise chemically reacting) with fibers **51** of carrier layers **37, 38, 40**, and/or **41**, as shown in FIG. **4A**. With regard to penetration, integrally bonded means that a portion of the strand outer surface has penetrated at least about 10%, preferably at least about 25%, more preferably at least about 50%, even more preferably at least about 75%, most preferably about 100% of carrier layer structural thickness T of carrier layer **37, 38, 40**, and/or **41** in laminate structure **66** and/or **67**. Further, because integrally bonded strands enhance the comfort of laminate structures **66** and/or **67** when worn about the body, at least about 10%, preferably at least about 50%, more preferably at least about 90%, most preferably about 100%, of first strands **24** are integrally bonded to carrier layers **37, 38, 40**, and/or **41** of laminate structures **66** and/or **67**.

The above described benefits can be achieved by selecting a first strand material having a softening temperature which is lower than the softening temperature of second strands **26** relative to the processing pressures used to form laminate structures **66** and/or **67**. As used herein, the phrase "softening temperature" is intended to mean the minimum temperature at which a material begins to flow under an applied pressure to facilitate integral bonding of the material to a carrier layer or layers. Typically, heat is applied to a material to achieve a softening temperature. This generally results in a decrease in the viscosity of the material which may or may not involve a "melting" of the material, the melting being associated with a latent heat of fusion. Thermoplastic materials tend to exhibit a lowering in viscosity as a result of an increase in temperature allowing them to flow when subjected to an applied pressure. It will be understood that as the applied pressure increases, the softening temperature of a material decreases and therefore a given material can have a plurality of softening temperatures because the temperature will vary with the applied pressure. For ease of manufacturing and processing, and when utilizing generally polymeric materials for strands **24** and **26**, it is preferred that the softening temperature of first strands **24** be lower, at least about 10° C. lower, more preferably at least about 20° C. lower, than the softening temperature of second strands **26** when both materials are subjected to the same applied pressure (e.g., the processing pressure). As used herein, the phrase "bonding pressure", is intended to mean the pressure which facilitates the integral bonding of first strands **24** to carrier layers **37** and **38**, without integrally bonding second strands **26** to carrier layers **37** and **38**, when both strands are at the softening temperature of first strands **24** but below the softening temperature of second strands **26**. In addition to the selection of first and second strand materials for softening temperature point, second strands **26** are preferably formed from a material which renders second strands **26** appropriately elastic such that laminate structures **66** and/or **67** provide a structural direction, along the direction of second strands **26**, which is also appropriately elastic as desired.

Polymers such as polyolefins, polyamides, polyesters, and rubbers (i. e., styrene butadiene rubber, polybutadiene rubber, polychloroprene rubber, nitrile rubber and the like) have been found to be suitable, but not limited to, materials for forming the first and second strands of elastic member **36** and/or **39**. Other materials or compounds (i. e., adhesive first strands) having different relative softening temperatures or elasticity can be substituted so long as the material provides the previously described benefits. Additionally, adjunct materials can be added to the base materials comprising first and second strands (i. e., mixtures of pigments, dyes, brighteners, heavy waxes and the like) to provide other desirable visual, structural or functional characteristics.

Elastic members **36** and/or **39** may be formed from one of a variety of processes known in the art. A particularly

suitable material for use as first and/or second elastic member **36** and/or **39** is an elastic scrim available as T50018 from Conwed Plastics, Minneapolis, Minn.

Alternatively, first and second elastic members **36** and **39** may each be selected from natural or synthetic rubber, or any number of polymeric materials which are capable of elongation and recovery. Suitable materials include, but are not limited to, styrene block copolymers, rubber, Lycra™, Krayton™, polyethylene including metallocene catalyst PE, foams including polyurethane and polyesters, and the like. First and second elastic members **36** and **39** may be in the form of films, strands, scrims, ribbons, tapes, structural elastic-like film, and the like.

For ease of manufacture and cost efficiency, carrier layers **37, 38, 40**, and/or **41** are preferably formed from, but not limited to, a non-woven fabric having fibers formed, for example, from polyethylene, polypropylene, polyethylene terepthalate, nylon, rayon, cotton or wool. These fibers can be joined together by adhesives, thermal bonding, needling/felting, or other methods known in the art to form carrier layers **37, 38, 40** and/or **41**. Although it is preferred that carrier layers **37, 38, 40**, and/or **41** are formed from a non-woven fabric, other fabrics such as wovens and knits, would be suitable.

The softening temperature of carrier layers **37, 38, 40**, and/or **41** (at the subject processing pressures) should be greater than any of the processing temperatures applied to elastic member **36** and/or **39** in forming laminate structures **66** and/or **67**. In addition, carrier layers **37, 38, 40**, and/or **41** of the present invention preferably have a modulus of less than about 100 gm force per cm at a unit strain ϵ_μ of at least about 1 (i. e., $L_f=2\times L_o$) in a direction along second strands **26** when it is formed into laminate structure **66** and/or **67**. As used herein, the term "modulus" is intended to mean the ratio of an applied stress σ to the resulting unit strain ϵ_μ, wherein stress σ and strain ϵ_μ are:

$$\sigma=F_a/W$$

$$\epsilon_\mu=(L_f-L_o)/L_o$$

Where

F_a=Applied force

W=Orthogonal dimension of the element or structure subjected too the applied force F_a (typically the structure width)

L_f=Elongated length

L_o=Original length

For example, a 20 gram force applied orthogonally across a 5 cm wide fabric would have a stress σ of 4 grams force per cm. Further, if the original length L_o in the same direction as the applied force F_a were 4 cm and the resulting elongated length L_f were 12 cm, the resulting unit strain ϵ_μ would be 2 and the modulus would be 2 grams force per cm.

It is believed that a carrier layer having a modulus of less than about 100 grams force per cm in a subject fabric direction will, when the subject fabric direction is juxtaposed co-directional with elastic second strands **26** in laminate structures **66** and/or **67**, provide a laminate structure **66** and/or **67** with a modulus along the direction of second strands **26** that is largely a function of the material properties, size, and arrangement of second strands **26**. In other words, the modulus of carrier layers **37, 38, 40**, and/or **41** will be low enough that the modulus of the second strands **26** will largely determine the modulus of laminate structures **66** and/or **67** in the subject direction. This configuration is especially useful if it is desired that laminate structure **66** and/or **67** provide an elastic structural direction along the direction of deformed laminate second strands **27**.

If carrier layers **37, 38, 40** and/or **41** do not inherently provide the desired modulus, carrier layers **37, 38, 40** and/or **41** can be subjected to an activation process before or after forming laminate structures **66** and/or **67**. As taught for instance in U.S. Pat. No. 4,834,741, issued to Sabee on May 30, 1989, incorporated in its entirety herein by reference, subjecting carrier layers **37, 38, 40** and/or **41** to an activation process (either separately or as part of laminate structures **66** and/or **67**) will plastically deform carrier layers **37, 38, 40** and/or **41** such that it will provide the desired modulus. In an activation process, such as that taught by Sabee, carrier layer **37, 38, 40** and/or **41** (or laminate structure **66** and/or **67** incorporating same) is passed between corrugated rolls to impart extensibility thereto by laterally stretching carrier layers **37, 38, 40** and/or **41** in the cross-machine direction. Carrier layers **37, 38, 40** and/or **41** are incrementally stretched and drawn to impart a permanent elongation and fabric fiber orientation in the cross-machine direction. This process can be used to stretch carrier layers **37, 38, 40** and/or **41** before or after joinder of laminate structures **66** and/or **67**. This preferably provides a laminate structure which can be extended in an elastic structural direction with minimal force as carrier layers **37, 38, 40** and/or **41** (and any additional layers) have initially been "activated" or separated in this direction, thereby providing a low modulus in the subject direction such that the laminate structure modulus is primarily a function of laminate second strands **27**.

Laminate structures **66** and/or **67** are preferably formed by juxtaposing carrier layers **37, 38, 40** and/or **41** and elastic members **36** and/or **39** and applying a predetermined pressure or a predetermined pressure and heat flux, depending upon the selected materials for carrier layers **37, 38, 40** and/or **41** and elastic members **36** and/or **39**, so that first strands **24** are integrally bonded to carrier layers **37, 38, 40** and/or **41**. In addition to integrally bonding first strands **24** to carrier layers **37, 38, 49** and/or **41**, it is desirable that the above described process deform first strands **24** so that the shape of integrally bonded first strand outer surface **47** is substantially flat. The phrase "substantially flat" and its derivatives, as used herein, means that integrally bonded first strands **25** have a major dimension M (i. e., the largest dimension parallel to the major axis of the strand cross section as shown in FIG. **4**) at least about **2** times the length of a minor dimension N (i. e., the smallest dimension parallel to the minor axis of the strand cross section as shown in FIG. **4**) Thus, it should be clear that an integrally bonded first strand **25** can have irregularities in outer surface **47** (i. e., peaks and valleys and the like, as shown in FIG. **4**A) and still be within the intended meaning of substantially flat. More preferably, it is desirable that a portion of outer surface **47** of integrally bonded first strands **25** is also substantially coplanar with carrier layer inner surfaces **50** and **52** such that minor dimension N is about equal to or less than structural thickness T of carrier layers **37, 38, 40** and/or **41** and substantially all of minor dimension N is located within structural thickness T, as generally shown in FIG. **4**. It is further contemplated that variations in the substantially flat and coplanar shapes of integrally bonded first strands **25** can occur along the length of first strands **25** without deviating from the scope of these definitions. In other words, due to processing variations, it is noted that portions of integrally bonded first strands **25** can be substantially flat and/or coplanar while other portions along the same strand may not. These configurations are still considered to be within the definitions of substantially flat and coplanar as set forth above.

The above described shapes of integrally bonded first strands **25** advantageously provide laminate structures **66** and/or **67**, wherein strands **25** do not protrude in a manner which would cause irritation or other discomfort when laminate structures **66** and/or **67** are cut (thereby exposing the ends of integrally bonded first strands **25**) and worn about the body. As such, at least about 25%, preferably at least about 50%, more preferably at least about 75%, and most preferably about 100% of integrally bonded first strands **25** are substantially flat and coplanar.

In contrast to the substantially flat and coplanar shape of integrally bonded first strands **25** of laminate structures **66** and/or **67**, laminate second strands **27** are preferably only joined (as opposed to integrally bonded) to carrier layer inner surfaces **50** and **52**, as shown in FIG. **4**, by application of the above described pressure and heat flux. It is contemplated, however, that second strands **26** can also be integrally bonded to carrier layers **37**, **38**, **40** and/or **41** if so desired. The integral bonding of first strands **24** to carrier layers **37**, **38**, **40** and/or **41** can also be performed such that first strands **24** act as an adhesive to intermittently join second strands **26** to carrier layer inner surfaces **50** and **52** at nodes **31**. Alternatively, second strands **26** can comprise a self-adhering material which aids in joining a portion of second strand outer surfaces **49** to carrier layer inner surfaces **50** and **52**.

As seen in FIG. **5**, laminate structures **66** and/or **67** are preferably manufactured by a process comprising a substantially non-resilient first surface **148** (i. e., formed from steel or the like), a substantially non-resilient second surface **150**, and a substantially resilient third surface **152** (i. e., formed from a silicone or other deformable rubber), wherein these surfaces are provided in the form of rollers. First surface **148** is spaced adjacent second surface **150** such that gap **156** is formed therebetween, while second surface **150** and third surface **152** are positioned in surface contact to one another thereby forming interference nip **154**. Gap **156** is preferably sized such that first strands **24** and second strands **26** pass easily therethrough. Alternatively, gap **156** may be sized such that second strands **26** are deformed by passing therethrough.

First carrier layer **37** is juxtaposed adjacent to first elastic member **36** which is juxtaposed adjacent to second carrier layer **38** such that when fed around first surface **148**, as seen in FIG. **5**, first elastic member **36** is disposed between first carrier layer **37** and second carrier layer **38**. Preferably, first strands **24** of first elastic member **36** are juxtaposed adjacent inner surface **50** of first carrier layer **37** and second strands **26** are juxtaposed adjacent inner surface **52** of second carrier layer **38**. First carrier layer **37** is preferably oriented adjacent first surface **148**. First surface **148** is heated to a temperature T_1, which, in combination with the feed rate of juxtaposed first carrier layer **37**, first elastic member **36**, and second carrier layer **38** over first surface **148**, raises the temperature of first strands **24** to, or above, their softening temperature. Because of the low applied pressure P_d at gap **156**, first strands **24** and second strands **26** undergo little if any deformation thereat.

After juxtaposed first carrier layer **37**, first elastic member **36**, and second carrier layer **38** pass through gap **156**, second carrier layer **38** is preferably oriented adjacent second surface **150** and disposed between second surface **150** and first elastic member **36** and first carrier layer **37**. Second surface **150** is preferably heated to a temperature T_2, which in combination with the feed rate of juxtaposed first carrier layer **37**, first elastic member **36**, and second carrier layer **38** over second surface **150**, raises the temperature of second strands **26** to their softening temperature. Juxtaposed first carrier layer **37**, first elastic member **36**, and second carrier layer **38** then pass through interference nip **154**, wherein first strands **24** are integrally bonded to first carrier layer **37** and second carrier layer **38** by the application of first strand bonding pressure P_b from second and third surfaces **150** and **152** at nip **154**. Resilient third surface **152** provides bonding pressure P_b which is uniformly applied to first strands **24** between second strands **26** due to the conforming nature of resilient third surface **152**. More preferably, the application of pressure P_b from third surface **152** and heat flux from second surface **150** at temperature T_2 is sufficient to deform first strands **24** into substantially flat shaped and integrally bonded first strands **25**. Most preferably, the application of pressure and heat flux is sufficient to deform first strands **24** into integrally bonded first strands **25** which are substantially coplanar with inner surface **50** of first carrier layer **37** and second carrier layer **38**.

In contrast, at least about 25%, preferably at least about 50%, more preferably at least about 75%, most preferably about 100%, of second strands **26** are deformed into a substantially elliptical shape at nip **154** because pressure P_b is fully applied to second strands **26** by second surface **150**. The elliptical cross-sectional shape of second strands **27** is desirable if the undeformed cross section of the second strands **26** would otherwise produce a "nubby" or rough feel when laminate structures **66** and/or **67** are worn about the body. Preferably, the post-nip structural thickness I of laminate structures **66** and/or **67** is about 50% of the pre-nip structural thickness S of juxtaposed first carrier layer **37**, first elastic member **36**, and second carrier layer **38**.

The feed rate of juxtaposed first carrier layer **37**, first elastic member **36**, and second carrier layer **38** through first, second, and third surfaces **148**, **150**, and **152** can be adjusted so that first and second strands **24** and **26** have a sufficient residence time adjacent heated first and second surfaces **148** and **150** so that these strands can be softened and deformed as described herein.

Based upon the foregoing described nip process, it has been found that the following will form satisfactory laminate structures **66** and/or **67** having an elastic structural direction along the direction of laminate second strands **27**: first, second, third, and fourth carrier layers **37**, **38**, **40** and **41** preferably comprise a carded nonwoven formed from thermally bonded polypropylene and having a 32 gram per m^2 basis weight, a fiber size of about 2.2 denier per filament, a caliper of between about 0.01 cm to about 0.03 cm, a modulus of about 100 grams force per cm at a unit strain ϵ_μ of 1 (such a fabric being marketed by Fibertech, Landisville, N.J., as Phobic Q-1); and first and second elastic members **36** and **39** comprise a mesh wherein first strands **24** are formed from polyethylene and second strands **26** are formed from a styrene or butadiene block copolymer (such a mesh being manufactured by Conwed, Minneapolis, Minn. and marketed as T50018). Specifically, the juxtaposed Phobic Q-1 fabric, T50018 mesh, and Phobic Q-1 fabric, having a pre-formed structural thickness S of from about 0.09 cm to about 0.13 cm, preferably from about 0.10 cm to about 0.12 cm, more preferably about 0.11 cm, are fed at a rate of from about 6 to about 14, more preferably from about 7 to about 12, most preferably from about 8 to about 10 meters per minute, over first surface **148** which is heated to a temperature T_1 of from about 71° C. to about 141° C., preferably from about 130° C. to about 141° C., more preferably from about 137° C. to about 139° C. In a preferred arrangement, gap **156** is preferably greater than or about 0.13 cm. Preferably, second surface **150** is heated to a temperature T_2

of from about 71° C. to about 141° C., preferably from about 130° C. to about 141° C., more preferably from about 137° C. to about 139° C., as the juxtaposed fabrics and mesh pass over second surface **150** and through inference nip **154**. Pressure P_b at nip **154** is preferably from about 55 to about 85 kilograms per centimeter, more preferably from about 70 to about 75 kilograms per centimeter. After the juxtaposed fabrics and mesh emerge from nip **154**, the resulting thermal bonded elastic laminates **66** and/or **67** have a thickness I of from about 0.05 cm to about 0.09 cm, preferably from about 0.06 cm to about 0.08 cm, more preferably about 0.07 cm.

In addition to forming a laminate structure of the present invention via the is above described nip process, such laminate structures can also be formed by a process providing a first plate **150** and a second plate **160**, such as shown in FIG. **6**. In contrast to the process discussed previously, first plate surface **149** preferably is substantially non-resilient, while second plate surface **151** is substantially resilient. First plate surface **149** is preferably heated to temperature T_1. A bonding pressure P_f is applied to the juxtaposed fabrics and mesh by moving first plate surface **149** toward second plate surface **151** appropriately. Because temperature T_1 heats first strands **24** to their softening temperature for the applied bonding pressure P_f, application of the bonding pressure P_f integrally bonds first strands **24** to carrier layers **37** and **38**. More preferably, application of the bonding pressure P_f also deforms first strands **24** into a substantially flat shape which is also coplanar with carrier layer inner surfaces **50** and **52**. Most preferably, application of bonding pressure P_f also deforms second strands **26** into a substantially elliptical shape.

Using the Phobic Q-1 fabrics and T50018 mesh combination described above, satisfactory laminate structures **66** and/or **67** having first strands **24** integrally bonded to first and second carrier layers **37** and **38** can be provided if first plate **158** is heated to a temperature T_1 of from about 110° C. to about 130° C. and a bonding pressure P_f of between 350 to 700 grams force per cm^2 is applied between first plate **158** and second plate **160** for from about 10 to about 20 seconds.

While the above description describes the process for making first thermal bonded elastic laminate **66** (i.e., comprising first carrier layer **37**, first elastic member **36**, and second carrier layer **38**), an identical process for making second thermal bonded elastic laminate **67** (i.e., comprising third carrier layer **40**, second elastic member **39**, and fourth carrier layer **41**) may be utilized.

It is believed that properly selecting the strand density, strand cross-sectional area, and/or the melt index of first strands **24** (if first strands **24** are formed of a polymer) is necessary in order to provide laminate structures **66** and/or **67** having an elastic structural direction along the direction of the second strands **27**. Improper selection of strand density, strand cross-sectional area, and/or melt index of first strands **24** can result in a laminate structure wherein portions of integrally bonded first strands **25** can overlap or merge together in laminate structures **66** and/or **67**. Such merging or overlap of integrally bonded first strands **25** can result in only small portions of laminate second strands **27** being able to extend or elongate when subjected to a tensile force, as opposed to the elongation being distributed along substantially the entire length of substantially all of laminate second strands **27** absent this overlap. To minimize this condition, the strand density, strand cross-sectional area, and/or melt index of first strands **24** should be selected such that integrally bonded first strands **25** have a strand coverage S_c of less than about 50%. As used herein, the phrase "strand coverage" is intended to be a measure of the amount of surface area of first carrier layer inner surface **50** and second carrier layer inner surface **52** which is in contact with integrally bonded first strands **25** of the present invention. Strand coverage Sc is defined as:

$$S_c=(E-F)/E*100$$

Where

E=strand centerline distance between any adjacent integrally bonded first strands **25**, as shown in FIG. **4**

F=strand edge distance F between any adjacent integrally bonded first strands **25**, as shown in FIG. **4**

The measurements of E and F can be taken at any cross section through laminate structure **66** and/or **67** between any adjacent integrally bonded first strands

The phrase "strand density", as used herein, is intended to mean the number of subject strands per centimeter along a strand transverse to the subject strands. For example, first strands **24** have a strand density which can be measured over a predetermined length A of a second strand **26**, as shown in FIG. **3**. Likewise, second strands **26** have a strand density which can be measured over a predetermined length B of a first strand **24**. The phrase "strand cross-sectional area", as used herein, is intended to mean the cross-sectional area of any first strand **24** when measured according to techniques known in the art.

The melt index of a polymer measures the ability of the polymer to flow when subjected to a given temperature or pressure. A polymer having a low melt index will be more viscous (and therefore not flow as readily) at a given temperature than a polymer having a higher melt index. Thus, it is believed that first strands **24** comprising a polymer having a high melt index will have a greater tendency to merge or overlap during application of a given pressure and heat flux than first strands **24** comprising a polymer having a lower melt index and subjected to the same pressure and heat flux. Because of this variability, the polymer forming first strands **24** can be selectively chosen, in conjunction with the strand density and strand cross-sectional area, to provide a predetermined melt index such that first strands **24** are integrally bonded to first and second carrier layer **37** and **38** with a strand coverage S_c of about 50 percent. In addition, varying the polymer melt index can also be especially useful where it is desired to increase the density of first and second carrier layers **37** and **38** while maintaining the same processing conditions. In this situation, the polymer of first strands **24** can be changed to provide a higher melt index such that first strands **24** can more easily penetrate and bond with carrier layer **37**, **38**, **40**, and/or **41** when subjected to the predetermined pressure and heat flux. Consequently, the same level of integral bonding can be achieved without changing the processing conditions despite the increased density of carrier layers **37**, **38**, **40**, and/or **41**.

Based upon the foregoing, it is believed that first strands **24** should preferably be aligned so as to provide a strand density of from about 2 to about 10 strands per centimeter in conjunction with a strand cross-sectional area of from about 0.0005 cm^2 to about 0.03 cm^2, more preferably from about 3 to about 6 strands per centimeter in conjunction with a strand cross-sectional area of from about 0.001 cm^2 to about 0.005 cm^2, so that merger or overlap of integrally bonded first strands **25** in laminate structure **66** and/or **67** can be avoided. A melt index of from about 2 to about 15 (as measured per ASTM D1238) in conjunction with the above-described strand density and strand cross-sectional area

values has been found to be satisfactory. With regard to second strands **26**, it is believed that the strand density, strand cross-sectional area, and modulus of second strands **26** can also affect the elastic properties of laminate structures **66** and/or **67** (i. e., the modulus of laminate structures **66** and/or **67**) in the direction along the second strands **26** (i. e., along irection D of FIG. **4**). For example, as the strand density and/or the strand cross-sectional area of second strands **26** increases, the modulus of laminate structures **66** and/or **67** will decrease. For laminate structures **66** and/or **67** to be incorporated into the wraps of the present invention, it is desirable that a modulus of from about 100 to about 250 grams force per cm, at a strain ϵ_μ of about 1 be provided. It is believed that providing second strands **26** having a strand density of from about 2 to about 5, a cross-sectional area of from about 0.003 cm^2 to about 0.02 cm^2, and comprising a styrene butadiene block copolymer will provide laminate structures **66** and/or **67** having the preferred modulus in a direction along second strands **26**. The modulus of laminate structures **66** and/or **67** can be measured by techniques known in the art. For example, the modulus of laminate structures **66** and/or **67** can be measured using a universal constant rate of elongation tensile tester, such as Instron Model #1122, manufactured by Instron Engineering Corp., Canton, Mass.

Laminate structures **66** and/or **67** can also be subjected to various additional post-formation processes known in the art. For example, a laminate structure made in accordance herewith can comprise additional fabric layers (i.e., bulking layers) which are joined to the laminate structure so as to further improve the wearability and comfort of the structure. The additional fabric layers can be secured to the laminate structure by adhesive, thermal bonding, pressure bonding, ultrasonic bonding, dynamic mechanical bonding, or any other suitable methods known in the art.

To improve the elastic performance of wrap **10**, elastic portion **20** may be subjected to an activation process after assembly and prior to use. This activation process stretches and permanently deforms on a very small scale the nonelastic layers of wrap **10**. This activation process allows first and/or second thermal bonded elastic laminate **66** and/or **67** to stretch or expand in the direction of an applied force and essentially return to their original dimensions upon removal of the force, unencumbered by the nonelastic layers of elastic portion **20**.

Alternatively, elastic portion **20** may be assembled while first and/or second thermal bonded elastic laminates **66** and/or **67** are held in an extended state. After assembly, the first and/or second thermal bonded elastic laminates **66** and/or **67** are allowed to return to their relaxed state causing the nonelastic layers of elastic portion **20** to fold and buckle creating rugosities. Subsequent stretching of elastic portion **20** will result in the unfolding of these rugosities.

In a preferred embodiment of the present invention there is a second elastic portion **56** located intermediate heat cells **75** and/or thermal packs **22**. Materials and processes used to deliver elastic portion **20** described herein above may also be used to deliver second elastic portion **56**.

A particular embodiment of wrap **10** is described which has two thermal bonded elastic laminates **66** and **67**, which are coextensive body-facing material **62** and outer surface material **64**. Preferably, first and second thermal bonded elastic laminates **66** and **67** extend from first end **14** to second end **16** of flexible material **12**. Alternatively, first and second thermal bonded elastic laminates **66** and **67** may extend from first end **14** to interfacial centerline **54** of flexible material **12** to provide elastic properties to first and second straps **80** and **82**. Interfacial centerline **54** is preferably aligned perpendicular to longitudinal axis **18** located between first end **14** and second end **16**.

A particular embodiment of wrap **10** is described which utilizes a number of layers. Alternatively, wrap **10** could be comprised of a single elastic member. First carrier layer **37** and second carrier layer **38** are employed during the thermal bonding of first elastic member **36** and third carrier layer **40** and fourth carrier layer **41** are employed during the thermal bonding of second elastic member **39**. If the thermal bonding step is not used for any number of reasons, then first carrier layer **37**, second carrier layer **38**, third layer **40**, and fourth carrier layer **41**, may be omitted.

Body-facing material **62** of flexible material **12** comprises body-facing surface **28** coextensive from first end **14** to second end **16**. Body-facing material **62** comprises a plurality of loop elements **102** which are formed from fibers of material **62**. Similarly, outer surface material **64** of flexible material **12** comprises outer surface **30** coextensive from first end **14** to second end **16**. Outer facing material **64** comprises a plurality of loop elements **104** which are formed from fibers of material **64**. The plurality of loop elements **102** and **104** serve as one-half of a reclosable hook and loop fastening system. As used herein, the term "reclosable", refers to that property of a fastening system which provides for initial closing of the fastening system, a subsequent opening of the fastening system, followed by at least one additional closings of the same fastening system. The subsequent closing of the fastening system may either return the closure to the original position or it may result in a repositioning of the closure from the initial configuration.

Body-facing surface **28** comprises at least one hook member **34** which is permanently attached to body-facing surface **28** near first end **14**. Similarly, outer surface **30** comprises at least one hook member **32** which is permanently attached to outer surface **30** near second end **16**. The plurality of hooks on hook members **32** and **34** serves as the second half of a reclosable hook and loop fastening system. As used herein, the term "permanently attached", is defined as the joining of two or more elements which remain joined during their intended use.

Hook member **32** with loop elements **102** and hook member **34** with loop elements **104**, provide a reclosable hook and loop fastening system for securing wrap **10** around the user's knee or elbow.

Alternatively, the reclosable fastening system of wrap **10** may be a single hook and loop fastening system comprising either hook member **32** and loop elements **102** or hook member **34** and loop elements **104**.

Body-facing material **62** and outer surface material **64** may be any number of different materials which include, but are not limited to, woven and knit fabrics, carded nonwovens, spunbond nonwovens, and the like. A material that has been found to be particularly suitable for body-facing material **62** and outer surface material **64** is a carded thermally bonded nonwoven of polypropylene with a basis weight of 32 grams per square meter (gsm). This material is available as grade #9327786, from Veratec, Walpole, Mass.

The hooks of hook members **32** and **34** may be any number of styles, shapes, and/or densities depending upon the use. The hooks of hook members **32** and **34** may be bent shafts, mushroom capped, harpoon-shaped, or any other suitable shape, unidirectional, bi-directional, or omni-directional, depending upon the application and companion loop elements of loop members **102** and **104**. The hooks of hook members **32** and **34** must be chosen in conjunction with companion loop elements of loop members **102** and

104 so as to provide the peel and shear forces that are required for different applications.

The attachment of layers to form body-facing laminate **92**, outer surface laminate **93** and, finally, wrap **10** may be achieved by any number of attachment means known in the art. These include, but are not limited to, hot melt adhesive including spiral sprays, meltblown, control coat, and the like, latex adhesives applied via spray, printing gravure, and the like, thermal bonding, ultrasonic, pressure bonding, and the like. One particular method that has been used successfully is hot melt adhesive layer **60** available as 70-4589 from National Starch and Chemical Co., Bridgewater, N.J., applied via a spiral hot melt system at a rate of from about 0.5 to about 25 mg/cm^2.

Flexible material **12** preferably comprises first strap portion **80** and second strap portion **82**, each having at least one hook member **34** which can be independently fastened to loop members **104**. Upon application of wrap **10**, first end **14** of upper strap portion **80** encircles behind the user's knee or in front of the user's elbow, preferably above the knee or elbow, and first end **14** of second strap portion **82** encircles behind the user's knee or in front of the user's elbow, preferably below the knee or elbow. First end **14** of first and second strap portions **80** and **82** overlap second end **16** such that, hook members **32** on outer surface **30** near second end **16** engage loop elements **102** on body-facing surface **28**. Engagement of hook members **32** with loop elements **102** forms the first part of the two-part hook and loop fastening system. Continuing the application, hook members **34** on the body-facing surface **28** near first end **14** are placed in contact with loop elements **104** of outer surface **30** forming the second part of a two-part hook and loop fastening system. First strap portion **80** and second-strap portion **82** allow easier application and differential tensioning of material **12** during use. Additional strap portions may optionally be included.

Preferably, first and second strap portions **80** and **82** contain elastic portion **20** of flexible material **12**. That is first and second strap portions **80** and **82** preferably exhibit elastic behavior when stretched in a direction parallel to longitudinal axis **18**.

Flexible material **12** preferably comprises a body portion **81**. Body portion **81** has a first edge **83** and a second edge **84**. The distance between first edge **83** and second edge **84** measured in a direction transverse longitudinal axis **18** is the width of body portion **81** of flexible material **12**. First strap portion **80** of flexible material **12** has a first edge **85** and a second edge **86**. The distance between first edge **85** and second edge **86** measured in a direction transverse longitudinal axis **18** is the width of first strap portion **80** of flexible material **12**. Second strap portion **82** of flexible material **12** has a first edge **87** and a second edge **88**. The distance between first edge **87** and second edge **88** measured in a direction transverse longitudinal axis **18** is the width of second strap portion **82** of flexible material **12**.

Flexible material **12** preferably comprises an aperture **46** between interfacial centerline **54** and second end **16**. Aperture **46** is intended to be aligned with the wearer's patella or olecranon and serves to help properly position wrap **10** during use. Preferably, flexible material **12** has at least one slit **48**, more preferably two slits, extending from aperture **46**, one toward second end **16** and the other toward interfacial centerline **54**. Slit(s) **48** allows flexible material **12** to expand and close respectively as the user bends and straightens his/her knee or elbow. Slit(s) **48** may be of any shape, however, the rectangular shape, as depicted in FIG. **1**, is preferred. In the alternative, flexible material **12** may comprise slit **48** without aperture **46**.

Wrap **10** may further comprise stays **100**. Stays **100** are preferably embedded transverse to the longitudinal axis **18** and internally in the layers of flexible material **12** of wrap **10** and positioned adjacent interfacial centerline **54** and/or second end **16** of flexible material **12**. Stays **100** are preferably stripes of glue which are positioned to permit wrap **10** to bend with the knee or elbow, but minimizes bunching of flexible material **12**, which would otherwise occur after several knee or elbow bending cycles. Stays **100** serve as resilient stiffeners to cause wrap **10** to maintain its flatness against the user's leg or arm. Alternatively, stays **100** may be positioned on the outer surface **30** of wrap **10**. Typically, stays **100** extend to just short of the perimeter edges of wrap **10** so that the stiff ends of stays **100** are never in contact with user's leg or arm. However in a second alternative, the stays **100** may be positioned on body-facing surface **28** to increase friction between wrap **10** and user's leg or arm in order to reduce slippage of wrap **10** during use.

A preferred glue for stays **100** is HL1460-X made by Fuller, Minneapolis, Minn. Beads of about 5 mm in diameter are extruded onto the flexible material **12** with a conventional hot melt glue gun. The glue beads are then calendered or flattened via a compression roll to a thickness of from about 0.3 mm to about 5 mm, which determines the desired stays **100** stiffness.

Alternatively, stays **100** may be made of rigid plastic or metal because these materials may be applied more easily and are less costly to include. With rigid plastic and metal stays, pockets are typically sewn into wrap **10**, and then individual stays are formed and installed.

Body-facing surface **28** may optionally comprise foamed polymer strips aligned transverse to longitudinal axis **18** of flexible material **12** for increasing friction between wrap **10** and wearer's knee or elbow. If present, foamed polymer strips are typically located adjacent second end **16** and interfacial line **54**. The increased friction provided by foamed polymer strips serves to reduce slippage or relative movement between wrap **10** and the wearer. If present, the foam strips are typically about 25 mm wide and about 1.5 mm thick. High-tack polymers such as ethylene vinyl acetate copolymer (EVA) may be used instead of foamed polymer strips. The polymer strips may also serve as stays **100** and may be glued, thermally bonded or printed onto body-facing surface **28**.

Wrap **10** also comprises one or more heat cells **75**, preferably arranged in a pattern, as indicated in FIG. **1**. Heat cells **75** apply heat energy to the sides and top of the knee or elbow when flexible material **12** is secured around the user's knee or elbow. Heat cells **75** are typically constructed by forming a pocket **76** in base material **70**. Pocket **76** in base material **70** is then filled with an exothermic composition **74**. After filling pocket **76** in base material **70** with an exothermic composition **74**, a cover material **72** is placed over pocket **76** and heat sealed to base material **70** around the periphery of pocket **76**, encapsulating exothermic composition **74**, thereby forming heat cell **75**.

Heat cells **75** are spaced apart from each other and each heat cell **75** functions independently of the rest of the heat cells **75**. Each heat cell **75** preferably comprise a densely packed, particulate exothermic composition **74** which preferably substantially fills the available cell volume within the cell reducing any excess void volume thereby minimizing the ability of exothermic composition **74** to shift within the cell. Alternatively, exothermic composition **74** may be compressed into direct compaction articles before being placed into each cell.

Because the heat generating material is densely packed or compressed into direct compaction articles, heat cells **75** is

not readily flexible. Therefore, the spacing apart of heat cells **75** and the materials selected for base material **70** and cover material **72** between heat cells **75** allows wrap **10** to easily conform to the user's knee or elbow. Preferably, wrap **10** comprises one or more thermal packs **22** which comprise a plurality of individual heat cells **75**, preferably embedded within the laminate structure of the thermal pack **22**.

Thermal pack **22** may be made of any number of thermoplastic materials; however, it is preferred that base material **70** and/or cover material **72** be made of thermoplastic materials which are semirigid at a temperature of about 25° C. and below and which soften, i. e., become substantially less rigid, at a temperature above about 25° C. Different materials may be capable of satisfying the specified requirement provided that the thickness is adjusted accordingly. Such materials include, but are not limited to, polyethylene, polypropylene, nylon, polyester, polyvinyl chloride, polyvinylidene chloride, polyurethane, polystyrene, saponified ethylene-vinyl acetate copolymer, ethylene-vinyl acetate copolymer, natural rubber, reclaimed rubber, synthetic rubber, and mixtures thereof. These materials may be used alone or coextruded with a low melt temperature polymer including, but not limited to, ethylene vinyl acetate copolymer, low density polyethylene, and mixtures thereof. Such materials are also capable of containing exothermic composition **74** and limiting oxygen flow into pocket **76** and provides sufficient rigidity to prevent wrap **10** from folding or bunching during use, preventing unacceptable stretching of structures of the continuous layer during processing or use, and deterring easy access to the heat cell contents.

A particular base material **70** and cover material **72**, which has proven to be satisfactory, preferably comprises a coextruded film, having a first side of polypropylene and a second side of EVA, and having a combined thickness of from about 20 μm to about 30 μm, preferably about 25 μm. The polypropylene comprises from about 10% to about 90%, preferably from about 40% to about 60%, of the thickness of base material **70** and cover material **72**. When coextruded films of the type just described are used for base material **70** and cover material **72**, the EVA sides are preferably oriented toward each other to facilitate thermal bonding of cover material **72** to base material **70**.

Exothermic composition **74** may comprise any composition capable of providing heat. However, exothermic composition **74** preferably comprises a particulate mix of chemical compounds that undergo an oxidation reaction during use. Exothermic composition **74** may also be formed into agglomerated granules, direct compacted into compaction articles such as granules, pellets, tablets, and/or slugs, and mixtures thereof. The mix of compounds typically comprises iron powder, carbon, a metal salt(s), and water. Mixtures of this type react when exposed to oxygen, providing heat for several hours. Exothermic compositions suitable for inclusion in wrap **10** of the present invention may be found in WO9701313, published Jan. 16, 1997, to Burkett, et al., incorporated in its entirety herein by reference.

Heat cells **75** may comprise any geometric shape, e.g., disk, triangle, pyramid, cone, sphere, square, cube, rectangle, rectangular parallelepiped, cylinder, ellipsoid and the like. The preferred shape of heat cell **75** comprises a disk shaped geometry having a cell diameter of from about 0.2 cm to about 10 cm, preferably from about 0.5 cm to about 8 cm, more preferably from about 1 cm to about 5 cm, and most preferably from about 1.5 cm to about 3 cm. Heat cell **75** may comprise a height of from about 0.08 cm to about 1 cm, preferably from about 0.15 cm to about 0.9 cm, more preferably greater than from about 0.2 cm to about 0.8 cm, and most preferably about 0.4 cm.

The ratio of fill volume to cell volume of heat cell **75** is from about 0.7 to about 1.0, preferably from about 0.75 to about 1.0, more preferably from about 0.8 to about 1.0, even more preferably from about 0.85 to about 1.0, and most preferably from about 0.9 to about 1.0.

Oxygen permeability can be provided by selecting materials for the base material **70** and/or cover material **72** that have the specifically desired permeability properties. The desired permeability properties may be provided by microporous films or by films which have pores or holes formed therein. The formation of these holes/pores may be via extrusion cast/vacuum formation or by hot needle aperturing. Oxygen permeability can also be provided by perforating at least one of the base material **70** and cover material **72** with aeration holes using, for example, an array of pins having tapered points and diameters of from about 0.2 mm to about 2 mm, preferably from about 0.4 mm to about 0.9 mm. Oxygen diffusion into heat cell **75** during oxidation of the exothermic composition **74** typically ranges from about 0.01 cc O_2/min./5 cm^2 to about 15.0 cc O_2/min./5 cm^2 (at 21° C., 1 ATM), preferably from about 0.9 cc O_2/min./5 cm^2 to about 3 cc O_2/min./5 cm^2 (at 21° C., 1 ATM).

The velocity, duration, and temperature of the thermogenic oxidation reaction of the exothermic composition **74** can be controlled as desired by changing the area of contact with air, more specifically, by changing the oxygen diffusion/permeability.

Elastic thermal uniaxial joint wrap **10** may optionally comprise a layer of material located preferably on body-facing surface **28** of flexible material **12**. The layer of material is generally coextensive flexible material **12** from second end **16** to interfacial centerline **54**. The layer of material has elasticity in a direction transverse to longitudinal axis **18** of flexible material **12** and preferably, has an elastic recovery force which is as low as possible to minimize forces transverse to longitudinal axis **18**. The layer of material is typically attached to body-facing surface **28** along the perimeter of the layer of material using an adhesive. The layer of material provides coverage of the knee or elbow when the user's knee or elbow is bent and flexible material **12** expands separating slit(s) **48**. Such a material may comprise a flexible thermal laminate, such as those described herein for first and second thermal layer elastic laminates **66** and **67**.

Alternatively the layer of material may have elasticity in a direction parallel to longitudinal axis **18** in addition to elasticity in a direction transverse to longitudinal axis **18**.

When assembling wrap **10** for a knee, the width of body portion **81** of flexible material **12** is preferably from about 15 cm to about 25 cm, more preferably from about 18 cm to about 23 cm and most preferably from about 19 cm to about 21 cm. The width of first strap portion **80** and second strap portion **82** of flexible material **12** is typically less than the width of body portion **81** of flexible material **12**, preferably from about 2.5 cm to about 13 cm, more preferably from about 4 cm to about 8 cm, and most preferably from about 5 cm to about 7 cm.

When assembling wrap **10** for an elbow, the above described dimensions are preferably scaled appropriately to fit a user's elbow.

Preferably, finished wrap **10** is typically enclosed within a substantially oxygen impermeable package. To use, wrap **10** is removed from the oxygen impermeable package allowing oxygen to enter heat cell **75** and react with exothermic composition **74**.

While particular embodiments of the present invention have been illustrated and described, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended to cover in the appended claims all such modifications that are within the scope of the invention.

What is claimed is:

1. A disposable elastic thermal uniaxial joint wrap comprising:

a) a piece of flexible material having a first end and a second end, a body portion fixed between said first end and said second end, a first strap portion, and a second strap portion, wherein at least one of said body portion, first strap portion, and second strap portion, comprises one or more elastic laminate structures, said laminate structures comprising a first carrier layer, a second carrier layer, and a mesh disposed between said carrier layers, said mesh having a plurality of first strands intersecting a plurality of elastic second strands, said first and second strands having softening temperatures at an applied pressure, at least about 10% of said first strands being integrally bonded to said first carrier layer and said second carrier layer by application of a bonding pressure at said softening temperature of said first strands, wherein at least one of said body portion, first strap portion, and second strap portion is stretchable along a longitudinal axis of said piece of flexible material;

b) one or more heat cells comprising an exothermic composition spaced apart and fixedly attached across said body portion; and

c) a fastening means to hold said piece of flexible material around a user's knee or elbow.

2. A disposable elastic thermal uniaxial joint wrap according to claim 1 wherein at least 50% of said first strands are integrally bonded to said first carrier layer and said second carrier layer.

3. A disposable elastic thermal uniaxial joint wrap according to claim 2 wherein at least 90% of said first strands are integrally bonded to said first carrier layer and said second carrier layer.

4. A disposable elastic thermal uniaxial joint wrap according to claim 1 wherein said softening temperatures of said first and second strands are distinct at said bonding pressure, the softening temperature of said first strands being less than the softening temperature of said second strands.

5. A disposable elastic thermal uniaxial joint wrap according to claim 1 wherein said first carrier layer and said second carrier layer each have an outer surface and at least about 50% of said integrally bonded first strands are substantially flat in shape and coplanar with said outer surfaces.

6. A disposable elastic thermal uniaxial joint wrap according to claim 1 wherein at least 25% of said second strands have a substantially elliptical cross-sectional shape.

7. A disposable elastic thermal uniaxial joint wrap according to claim 6 wherein at least 50% of said second strands have a substantially elliptical cross-sectional shape.

8. A disposable elastic thermal uniaxial joint wrap according to claim 7 wherein at least 90% of said second strands have a substantially elliptical cross-sectional shape.

9. A disposable elastic thermal uniaxial joint wrap according to claim 1 wherein said integrally bonded first strands have a strand coverage of less than about 50 percent.

10. A disposable elastic thermal uniaxial joint wrap according to claim 1 wherein said heat cells comprise a densely packed particulate composition comprising iron powder, carbon, a metal salt, and water, said composition substantially fills the available cell volume within said heat cell reducing any excess void volume thereby minimizing the ability of said particulate composition to shift within said heat cells.

11. A disposable elastic thermal uniaxial joint wrap according to claim 10 wherein said heat cells comprise the shape of a disk having a diameter of from about 0.2 cm to about 10 cm and a height of greater than from about 0.2 cm to about 1.0 cm.

12. A disposable elastic thermal uniaxial joint wrap according to claim 11 wherein said heat cells comprise an exothermic composition having a physical form selected from the group consisting of dry agglomerated granules, direct compaction articles, and mixtures thereof, said compaction articles are selected from the group consisting of granules, pellets, tablets, slugs, and mixtures thereof.

13. A disposable elastic thermal uniaxial joint wrap according to claim 1 wherein said strap portions comprise said elastic laminate structures.

14. A disposable elastic thermal uniaxial joint wrap according to claim 1 wherein said body portion further comprises an aperture intended to be aligned with the user's patella or olecranon to establish a convenient locating point for wrapping said wrap around the user's knee or elbow.

15. A disposable elastic thermal uniaxial joint wrap according to claim 14 wherein said body portion further comprises at least one slit extending substantially longitudinally from said aperture for enabling said piece of flexible material to stretch transverse to said longitudinal axis at said aperture in order to accommodate bending of the user's knee or elbow.

16. A disposable elastic thermal uniaxial joint wrap according to claim 1 wherein said body portion further comprises at least one slit extending substantially along the longitudinal axis of said body portion enabling said piece of flexible material to stretch transverse to said longitudinal axis of said body portion in order to accommodate bending of the user's knee or elbow.

17. A disposable elastic thermal uniaxial joint wrap according to claim 1 wherein said flexible material further comprises one or more stays to resiliently stiffen said flexible material and thereby minimize bunching of said flexible material when said user's knee or elbow is repeatedly bent.

18. A disposable elastic thermal uniaxial joint wrap according to claim 1 wherein said fastening system is reclosable.

19. A disposable elastic thermal knee wrap according to claim 18 wherein said reclosable fastening system comprises a hook and loop fastening system.

20. A disposable elastic thermal uniaxial joint wrap according to claim 19 wherein said reclosable fastening system comprises a two part hook and loop fastening system.

21. A disposable elastic thermal uniaxial joint wrap comprising:

a) a piece of flexible material having a first end and a second end, a body portion fixed between said first end and said second end, a first strap portion, and a second strap portion, wherein at least one of said body portion, first strap portion, and second strap portion, comprises one or more elastic laminate structures, said laminate structures comprising a first carrier layer, a second carrier layer, and a mesh disposed between said carrier layers, said mesh having a plurality of first strands intersecting a plurality of elastic second strands, said

first and second strands having softening temperatures at an applied pressure, at least about 10% of said first strands being integrally bonded to said first carrier layer and said second carrier layer by application of a bonding pressure at said softening temperature of said first strands, wherein at least one of said body portion, first strap portion, and second strap portion is stretchable along a longitudinal axis of said piece of flexible material;

b) one or more thermal packs fixedly attached to said body portion, each thermal pack having a unified structure comprising at least one continuous layer of material and a plurality of individual heat cells spaced apart and fixedly attached to said continuous layer of material; and

c) a fastening means to hold said piece of flexible material around a user's knee or elbow.

22. A disposable elastic thermal uniaxial joint wrap according to claim **21** wherein said softening temperatures of said first and second strands are distinct at said bonding pressure, the softening temperature of said first strands being less than the softening temperature of said second strands.

23. A disposable elastic thermal uniaxial joint wrap according to claim **21** wherein said first carrier layer and said second carrier layer each have an outer surface and at least about 50% of said integrally bonded first strands are substantially flat in shape and coplanar with said outer surfaces.

24. A disposable elastic thermal uniaxial joint wrap according to claim **21** wherein at least 25% of said second strands have a substantially elliptical cross-sectional shape.

25. A disposable elastic thermal uniaxial joint wrap according to claim **21** wherein said integrally bonded first strands have a strand coverage of less than about 50 percent.

26. A disposable elastic thermal uniaxial joint wrap according to claim **21** wherein said thermal pack comprises at least one continuous layer of a coextruded material having a first side of polypropylene and a second side of a low melt temperature copolymer, wherein said continuous layer is semirigid at a temperature of about 25° C. and below, and substantially less rigid at a temperature of above about 25° C.

27. A disposable elastic thermal uniaxial joint wrap according to claim **21** wherein said heat cells comprise a densely packed particulate composition comprising iron powder, carbon, a metal salt, and water, said composition substantially fills the available cell volume within said heat cell reducing any excess void volume thereby minimizing the ability of said particulate composition to shift within said heat cells.

28. A disposable elastic thermal uniaxial joint wrap according to claim **21** wherein said heat cells comprise an exothermic composition having a physical form selected from the group consisting of dry agglomerated granules, direct compaction articles, and mixtures thereof, said compaction articles are selected from the group consisting of granules, pellets, tablets, slugs, and mixtures thereof.

29. A disposable elastic thermal uniaxial joint wrap according to claim **21** wherein said strap portions comprise said elastic laminate structures.

30. A disposable elastic thermal uniaxial joint wrap according to claim **21** wherein said body portion further comprises an aperture intended to be aligned with the user's patella or olecranon to establish a convenient locating point for wrapping said wrap around the user's knee or elbow.

31. A disposable elastic thermal uniaxial joint wrap according to claim **30** wherein said body portion further comprises at least one slit extending substantially longitudinally from said aperture for enabling said piece of flexible material to stretch transverse to said longitudinal axis at said aperture in order to accommodate bending of the user's knee or elbow.

32. A disposable elastic thermal uniaxial joint wrap according to claim **21** wherein said body portion further comprises at least one slit extending substantially along the longitudinal axis of said body portion enabling said piece of flexible material to stretch transverse to said longitudinal axis of said body portion in order to accommodate bending of the user's knee or elbow.

33. A disposable elastic thermal uniaxial joint wrap according to claim **21** wherein said flexible material further comprises one or more stays to resiliently stiffen said flexible material and thereby minimize bunching of said flexible material when said user's knee or elbow is repeatedly bent.

34. A disposable elastic thermal uniaxial joint wrap according to claim **21** wherein said fastening system is reclosable.

35. A disposable elastic thermal knee wrap according to claim **34** wherein said reclosable fastening system comprises a hook and loop fastening system.

36. A disposable elastic thermal uniaxial joint wrap according to claim **35** wherein said reclosable fastening system comprises a two part hook and loop fastening system.

* * * * *

US006017606A

United States Patent [19]

Sage et al.

[11] Patent Number: 6,017,606

[45] Date of Patent: *Jan. 25, 2000

[54] **REUSABLE MULTICOMPARTMENT THERMAL COMPRESS**

[75] Inventors: **Linda Sage; Don Sage**, both of Armonk, N.Y.

[73] Assignee: **Danscott Enterprises**, Armonk, N.Y.

[*] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

[21] Appl. No.: **08/857,196**

[22] Filed: **May 15, 1997**

[51] **Int. Cl.**[7] **B32B 3/12**

[52] **U.S. Cl.** **428/68**; 428/71; 428/72; 428/102; 428/167; 428/168; 428/192; 602/75; 602/76; 602/78; 607/108; 607/114

[58] **Field of Search** 428/68, 71, 72, 428/73, 74, 76, 102, 192, 167, 168; 206/484.1, 484.2; 602/75, 76, 78; 608/108, 109, 110, 111, 114

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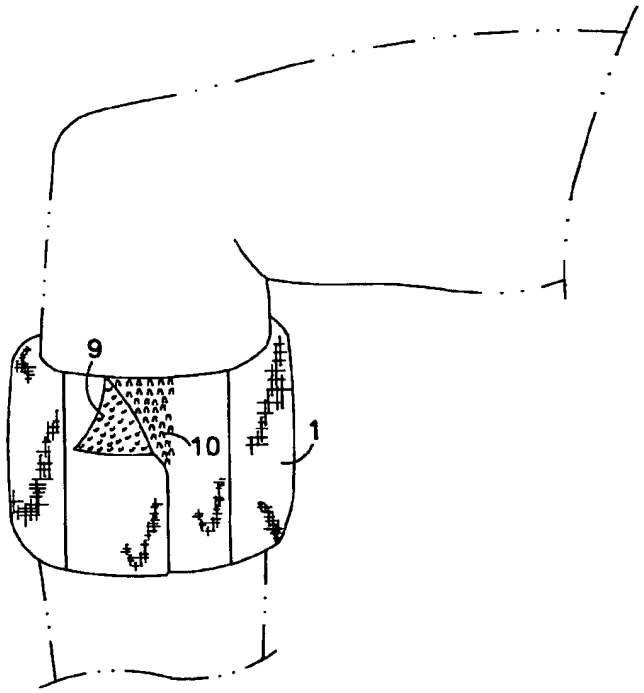
Primary Examiner—Nasser Ahmad

Attorney, Agent, or Firm—Amster, Rothstein & Ebenstein

[57] **ABSTRACT**

The present invention is directed to a reusable thermal pack that comprises a bag formed of a water-permeable fabric defining a plurality of laterally adjacent compartments, and a superabsorbent polymer disposed in the bag compartments, wherein the polymer forms a gel in the presence of an aqueous solution, and the bag compartments are gel-retainable. The thermal pack of the present invention can be applied as a cold or hot compress for medicinal purposes, and also as an aid for cooling down following exercise. The thermal pack of the present invention, once hydrated in the presence of the aqueous solution, becomes cool and stays cool for several days without refrigeration, and can be made cooler if chilled in the refrigerator or freezer, or warmed if placed in the microwave, if desired.

19 Claims, 2 Drawing Sheets



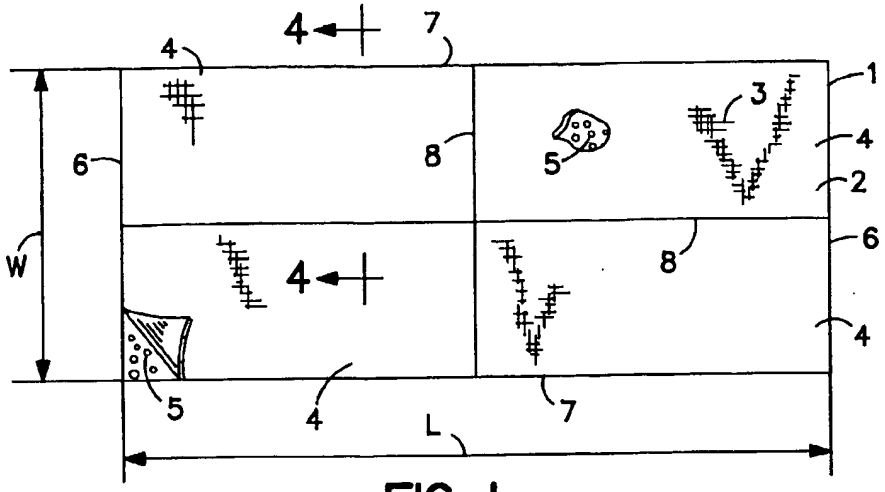


FIG. 1

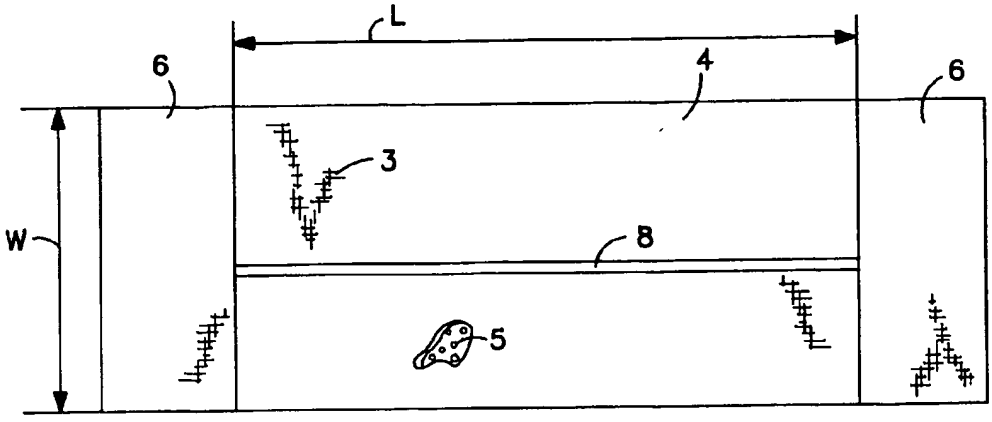


FIG. 2

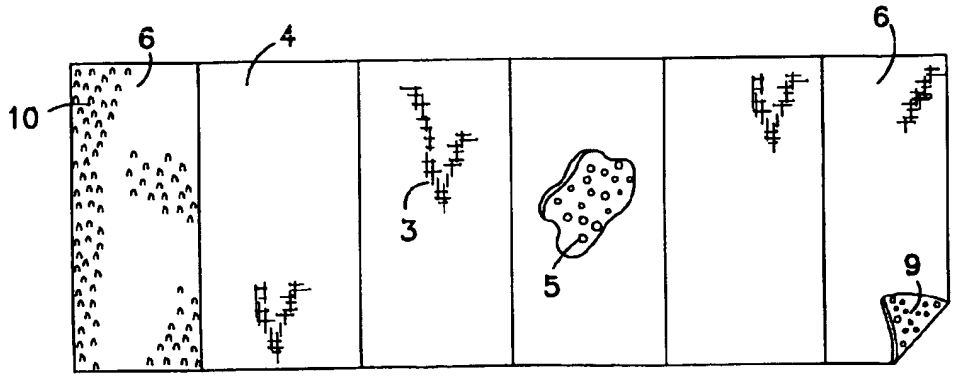


FIG. 3

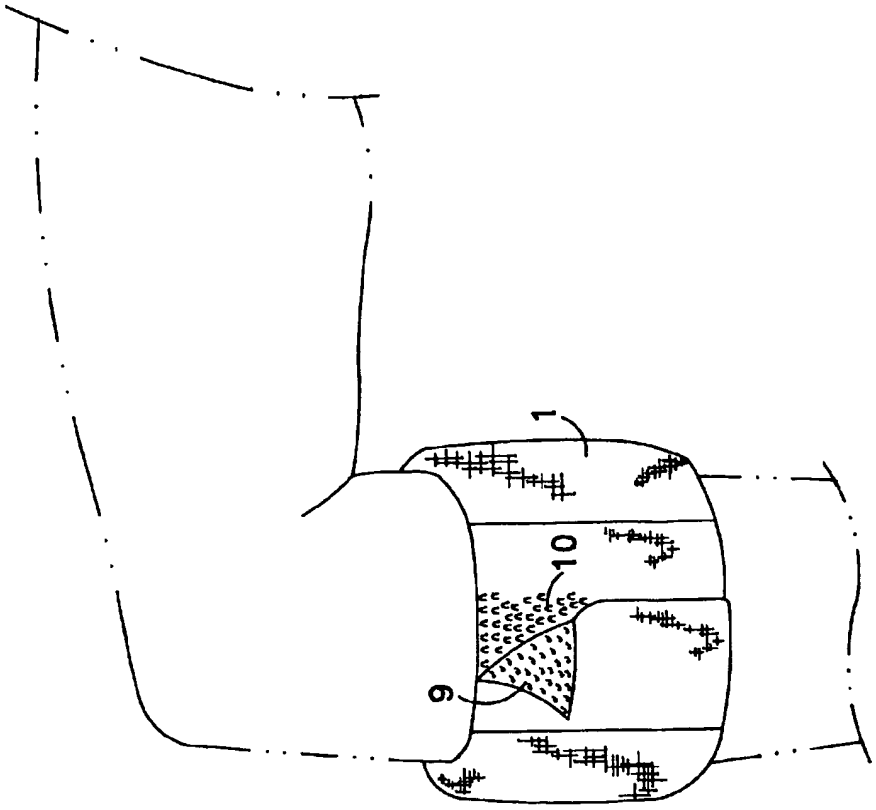


FIG. 5

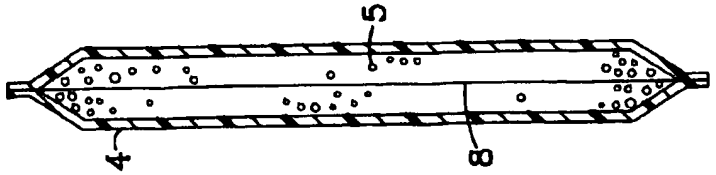


FIG. 4

REUSABLE MULTICOMPARTMENT THERMAL COMPRESS

BACKGROUND OF THE INVENTION

The present invention relates to a reusable multicompartment thermal pack comprising a bag formed of a water-permeable fabric defining a plurality of laterally adjacent compartments, and a superabsorbent polymer disposed in the bag compartments.

Thermal packs that can be chilled or heated for use as cold and hot compresses, respectfully, are well known in the prior art. For example, the most widely used thermal packs in the prior art are hot water bottles or ice bags made of rubber or plastic material. However, the problem with such packs is that they generally tend to be cumbersome, weighty and are not particularly useful for travel.

Other typical thermal packs in the prior art contain water, gel or other ingredients that permit the packs to be chilled or heated, and then applied to the desired area. For example, Kelley, U.S. Pat. No. 4,865,012, issued Sep. 12, 1989, describes such a reusable thermal pack that comprises a mixture of water, salt, cellulose and flour sealed in a pliable bag, that can be chilled or heated as desired. Gordon, et al., U.S. Pat. No. 4,910,978, issued Mar. 27, 1990, describes a reusable thermal pack comprising a gel-like substance in a plastic bag containing a fabric outer layer. However, the problem with such packs is that because they always contain water or gelled material, they tend to be cumbersome, weighty and take up a great deal of storage space.

In addition to the aforementioned packs, other packs are known in the prior art. For example, Anderson, U.S. Pat. No. 5,150,707, issued Sep. 29, 1992, describes a hot/cold thermal pack that contains an absorbent package having a gel-forming synthetic resin in particulate form deposited on an adhesive-coated substrate disposed between a pair of fibrous non-woven porous filter layers and covered on the outside by a pair of paper-like plies of nonwoven porous absorbent material. However, when the Anderson pack is exposed to water, the adhesive coating dissolves thus rendering the Anderson pack non-reusable. In addition, the Anderson pack is complex to manufacture.

Lahey, et al., U.S. Pat. No. 4,780,117, issued Oct. 25, 1988, describes a time-release cooling pack having a first compartment containing solid reactant particles coated with a reaction delaying penetrable coating and a second compartment containing a liquid which reacts with the solid reactant in an endothermic reaction. However, like the Anderson pack, the Lahey pack is not reusable, and in addition, can only be used as a cold pack.

Cheney, et al., U.S. Pat. No. 5,391,198, issued Feb. 21, 1995, describes a hot/cold thermal compress that comprises a water porous fabric bag containing a dehydrated water soluble acrylic polymer and a thickening agent to enhance the water absorption of the polymer. However, because the Cheney compress utilizes a water soluble polymer, a portion of the polymer will invariably be released from the compress when in contact with water, resulting in an unpleasant feel to the user, and also limiting the useful life of the compress. In addition, the Cheney compress requires the use of a thickening agent to enhance the water absorption of the polymer. A variation of this pack is also described in Cheney, et al., U.S. Pat. No. 5,534,020, issued Jul. 9, 1996, where ammonium nitrate or calcium chloride replace the thickening agent, and a separate, enclosed bag of water is also included within the pack.

Zafiroglu, U.S. Pat. No. 4,897,297, issued Jan. 30, 1990, describes a compress that comprises two outer layers surrounding a particulate filling material made of 5–30% of a superabsorbent polymer and 70–95% of a diluent such as wood pulp. At least one of the outer layers is a water-permeable, elastic fabric. The Zafiroglu Patent, however, teaches that concentrations of superabsorbent polymer greater than 30% should be avoided because at such concentrations, the filling material does not wet uniformly, may even block after absorbing but a small about of water, and its water-holding capacity per unit weight starts diminishing with further increases in concentration.

SUMMARY OF THE INVENTION

The present invention is directed to a reusable thermal pack that comprises a bag formed of a water-permeable fabric defining a plurality of laterally adjacent compartments, and a superabsorbent polymer disposed in the bag compartments, wherein the polymer forms a gel in the presence of an aqueous solution, and the bag compartments are gel-retainable. The pack of the present invention, once hydrated in the aqueous solution, becomes cool and stays cool for several days without refrigeration, and can be made cooler if chilled in the refrigerator or freezer, or warmed if placed in the microwave, if desired.

The thermal pack of the present invention can be applied as a cold or hot compress for medicinal purposes, and also as an aid for cooling down following exercise. In this connection, the pack of the present invention can be designed in any manner that facilitates the application of the pack to desirable body parts such as the neck, head, arms, elbows, wrists, legs, thighs, knees, calves, ankles, feet and the like. Unlike many prior art thermal packs, the pack of the present invention also is easy to manufacture, can be reused as often as desired, and when dehydrated, is lightweight and takes up little space, rendering the pack readily storable, and useful in travel.

In addition to these advantages, the thermal pack of the present invention, by containing a plurality of laterally adjacent compartments, promotes better surface area and a more uniform distribution of the gel than a pack of similar size having only a single compartment. The multicompartment pack of the present invention is also less voluminous and therefore requires less polymer than a pack of similar size having a single compartment. Since the multiple compartments are less voluminous and also require less polymer, the thermal pack of the present invention, when hydrated, is also less bulky, weighty and cumbersome than a similar size pack having only a single compartment.

BRIEF DESCRIPTION OF THE FIGURES

FIG. **1** is a top view of the thermal pack of the present invention.

FIG. **2** is a top view of another embodiment of the thermal pack of the present invention.

FIG. **3** is a top view of another embodiment of the thermal pack of the present invention.

FIG. **4** is a cross-sectional view of the thermal pack shown in FIG. **1**.

FIG. **5** represents the thermal pack of the present invention being worn on the leg of a user.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to FIG. **1**, the thermal pack (**1**) of the present invention comprises a bag (**2**) formed of a water-permeable fabric (**3**) defining a plurality of laterally adjacent

compartments (4), and a superabsorbent polymer (5) disposed in the bag compartments (4). As shown in FIGS. 1 and 2, the pack of the present invention may have a pair of longitudinally spaced end portions (6) defining a length L therebetween, and a pair of traversely spaced edges (7) defining a width W therebetween.

The bag compartments may be prepared from a single piece of fabric or a plurality of fabric pieces. The fabric should be water-permeable in the sense that water can penetrate the fabric causing the superabsorbent polymer to absorb moisture, and as the superabsorbent polymer releases moisture over time, permit the moisture to slowly evaporate through the fabric. The bag compartments should be gel-retainable in the sense that the gel formed in the presence of the aqueous solution stays contained within the bag compartments and does not penetrate through the fabric or into other bag compartments under normal soaking conditions. In the preferred embodiment, the fabric is made of nylon or similar material that is not only water-permeable and gel-retainable, but also permits good transfer of cold or heat from the gel to user, is not susceptible to mildew, and dries quickly.

"Laterally adjacent" means that the bag compartments are on the same plane and side-by-side although not necessary connected to one another. The bag compartments may be arranged in any manner so long as the majority of the surface area of the pack possesses bag compartments containing the superabsorbent polymer. By way of a non-limiting example, as shown in FIG. 1, the bag compartments may include two sets of parallel, longitudinally extending compartments (4). The bag compartments also may included two longitudinally extending compartments (4) that extend between the pair of longitudinally spaced end portions as shown in FIG. 2, or include four parallel, traversely extending compartments (4), each of which extends between the pair of traversely spaced edges as shown in FIG. 3. Other variations would be apparent to one skilled in the art. The bag compartments (4) may be separated by a bag compartment separator such as a single seam (8) as shown in FIG. 1, or a plurality of seams (8) defining an area devoid of superabsorbent polymer as shown in FIG. 2. The seams may be stitched, heat sealed, and the like.

Depending on the proposed use of the pack, the pair of longitudinally spaced end portions (6) may be the end of the bag compartments as shown in FIG. 1, or a separate area devoid of superabsorbent polymer as shown in FIG. 2. If the pack is to be used as a cooling device for putting around the neck, for example, the spaced end portions may comprise material that can be used for handling the pack such as fabrics made of cotton, nylon or some other material, and may also include a filler such as a polyester filler and the like. If the pack is to be used as a thermal pack for medicinal purposes, for example, the spaced end portions (6) also may comprise elements of a mating system such as hooks (9) and fabric (10) of Velcro as shown in FIG. 3, or other mating systems known in the art, and applied as shown in FIG. 5.

As used herein, a "superabsorbent polymer" is a dry, water-insoluble crystal-like polymer that is capable of absorbing and storing many times its weight in moisture, that slowly releases the moisture over time. Preferably, the superabsorbent polymer is in the form of crystalline granules having particle sizes that are sufficiently large (e.g. about 1 mm to about 3 mm) to prevent any loss of the dry polymer from the bag compartments. Suitable superabsorbent polymers preferably include superabsorbent polymers that are capable of absorbing at least a hundred times their weight in water, and preferably about 300–400 times their weight in water, such as the superabsorbent polymer sold under the trade name TERRA-SORB AG (a cross-linked anionic acrylic polymer) by Industrial Services International, Bradenton, Fla. However, other commercially available superabsorbent polymers can be used. The amount of dry, superabsorbent polymer present in the bag compartments will depend upon the volume of the bag compartments and the degree of absorption of the superabsorbent polymer. However, it is generally preferred that the superabsorbent polymer is disposed in the bag compartments in an amount effective to promote uniform distribution of the gel in the presence of a sufficient quantity of an aqueous solution.

To facilitate the use of the pack of the present invention, the pack is soaked in an aqueous solution such as water for a period of time until the superabsorbent polymer in the bag compartments is hydrated to the desired amount. It is generally preferred that the superabsorbent polymer should not be over hydrated causing the gel to expand through the bag compartments. However, if over hydration occurs, the polymer can be removed from the surface of the pack by washing the pack with soap and water. Since over hydration is more prone to occur during the first soaking, it may be desirable although not necessary to incorporate soap in the aqueous solution to facilitate the removal of any polymer that may be released from the pack due to over hydration. Once hydrated in the aqueous solution, the pack becomes cool and stays cool for several days without refrigeration. If a cooler pack is desirable, the pack may be chilled in the refrigerator or freezer, or some other cooling means. If the pack is to be used as a heat compress, the pack may be heated in the microwave, and the like.

The pack of the present invention may be designed to be in a variety of shapes and sizes. When the pack is to be used for draping around the neck, for example, the pack may be shaped like a scarf. The pack shown in FIG. 2, if extended longitudinally, can be used in such a manner. For application to other parts of the body, it may be desirable that the traverse edges of the pack be designed to allow a more comfortable wearing of the pack (e.g. curved edges).

All patents mentioned hereinabove are hereby incorporated by reference in their entirety. While the foregoing invention has been described in some detail for purposes of clarity and understanding, it will be appreciated by one skilled in the art from a reading of the disclosure that various changes in form and detail can be made without departing from the true scope of the invention in the appended claims.

What is claimed is:

1. A reusable thermal compress for application to a human or animal body part comprising a bag consisting essentially of a water-permeable fabric defining a plurality of laterally adjacent compartments, and a superabsorbent polymer disposed in the bag compartments, wherein the polymer forms a gel in the presence of an aqueous solution, the bag compartments are gel-retainable and the reusable thermal compress is configured and dimensioned for application to the body part.

2. The compress of claim 1, having a pair of longitudinally spaced end portions defining a length L therebetween, and a pair of traversely spaced edges defining a W therebetween.

3. The compress of claim 2, wherein the bag compartments are separated by a bag compartment separator.

4. The compress of claim 3, wherein the bag compartment separator is a seam or a plurality of seams defining an area devoid of superabsorbent polymer.

5. The compress of claim 2, wherein the bag compartments include a plurality of longitudinally extending compartments.

6. The compress of claim 5, wherein each of the longitudinally extending compartments extend between the pair of longitudinally spaced end portions.

7. The compress of claim 5, wherein the longitudinally extending compartments are parallel.

8. The compress of claim 2, wherein the bag compartments include a plurality of traversely extending compartments.

9. The compress of claim 8, wherein each of the traversely extending compartments extend between the pair of traversely spaced edges.

10. The compress of claim 8, wherein traversely extending compartments are parallel.

11. The compress of claim 2, where in the longitudinally spaced end portions are devoid of superabsorbent polymer.

12. The compress of claim 11, wherein the longitudinally spaced end portions comprise elements of a mating system.

13. The compress of claim 1, wherein the water-permeable fabric is nylon.

14. The compress of claim 1, wherein the superabsorbent polymer absorbs at least 100 times it weight in water.

15. The compress of claim 1, wherein the superabsorbent polymer is in the form of crystalline granules.

16. The compress of claim 1, wherein the superabsorbent polymer is disposed in the bag compartments in an amount effective to promote uniform distribution of the gel in the presence of a sufficient quantity of an aqueous solution.

17. A reusable thermal compress for application to a human or animal body part consisting essentially of a water-permeable nylon fabric defining a plurality of laterally adjacent bag compartments, and a superabsorbent polymer disposed in the bag compartments, wherein the polymer forms a gel in the presence of an aqueous solution, the superabsorbent polymer absorbs at least 100 times it weight in water, and the reusable thermal compress is configured and dimensioned for application to the body part.

18. The compress of claim 17, where the superabsorbent polymer absorbs 300–400 times it weight in water.

19. The compress of claim 17, which further comprises elements of a mating system.

* * * * *

United States Patent [19]

Hubbard et al.

[11] **4,347,848**

[45] **Sep. 7, 1982**

[54] **SMALL ICE PACK**

[75] Inventors: **Vance M. Hubbard**, Euless; **Welton K. Brunson**, Bedford, both of Tex.

[73] Assignee: **Tecnol, Inc.**, Fort Worth, Tex.

[21] Appl. No.: **184,466**

[22] Filed: **Sep. 5, 1980**

[51] **Int. Cl.**[3] **A61F 7/00**

[52] **U.S. Cl.** **128/402**; 128/403

[58] **Field of Search** 128/399, 400, 402, 403, 128/346

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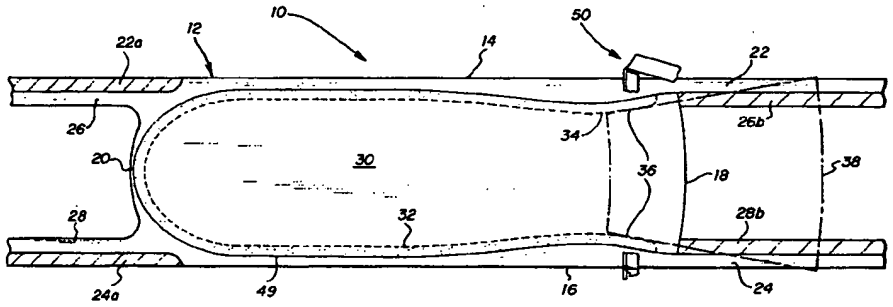
Primary Examiner—Kyle L. Howell
Assistant Examiner—C. W. Shedd
Attorney, Agent, or Firm—Richards, Harris & Medlock

[57] **ABSTRACT**

The specification discloses a refillable sanitary ice pack (**10**) for single patient use. The ice pack takes the form of a generally rectangular envelope (**12**) having two sides (**14, 16**), an open end (**18**) and a closed end (**20**). Two pairs of tie strings (**22, 24**) and (**26, 28**) extend from the open and closed ends, respectively. A bag (**30**) closed on three sides and having a throat (**34**) opening at the open end of the envelope is formed internally of the envelope for receiving and retaining ice. A funnel (**38**) dimensioned to conform with the divergence of the throat in the bag may be inserted into the throat for filling the bag. A closure member (**50**) is also provided for sealing the throat of the bag when the bag has been filled with ice.

8 Claims, 5 Drawing Figures



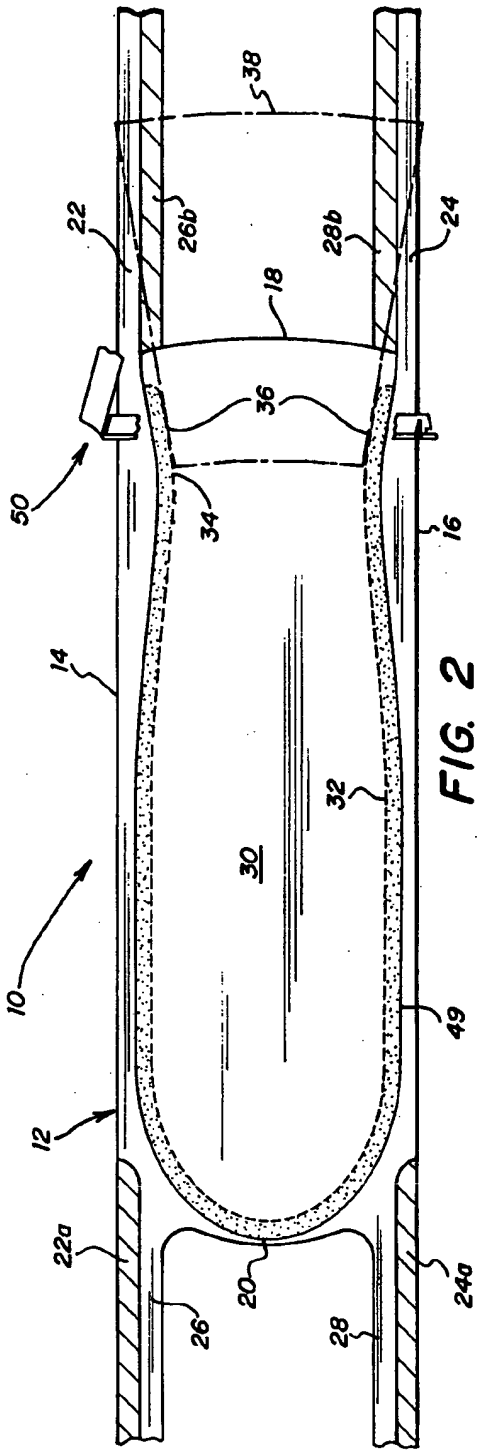


FIG. 2

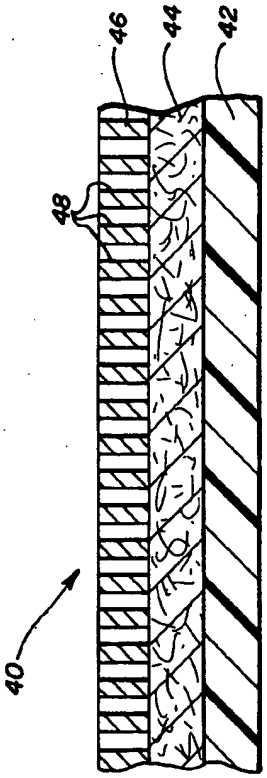


FIG. 3

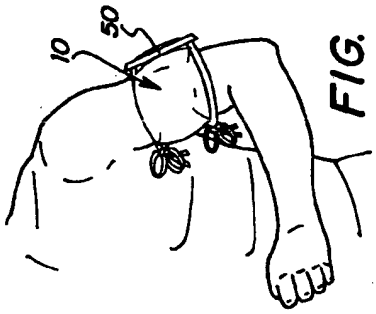


FIG. 1

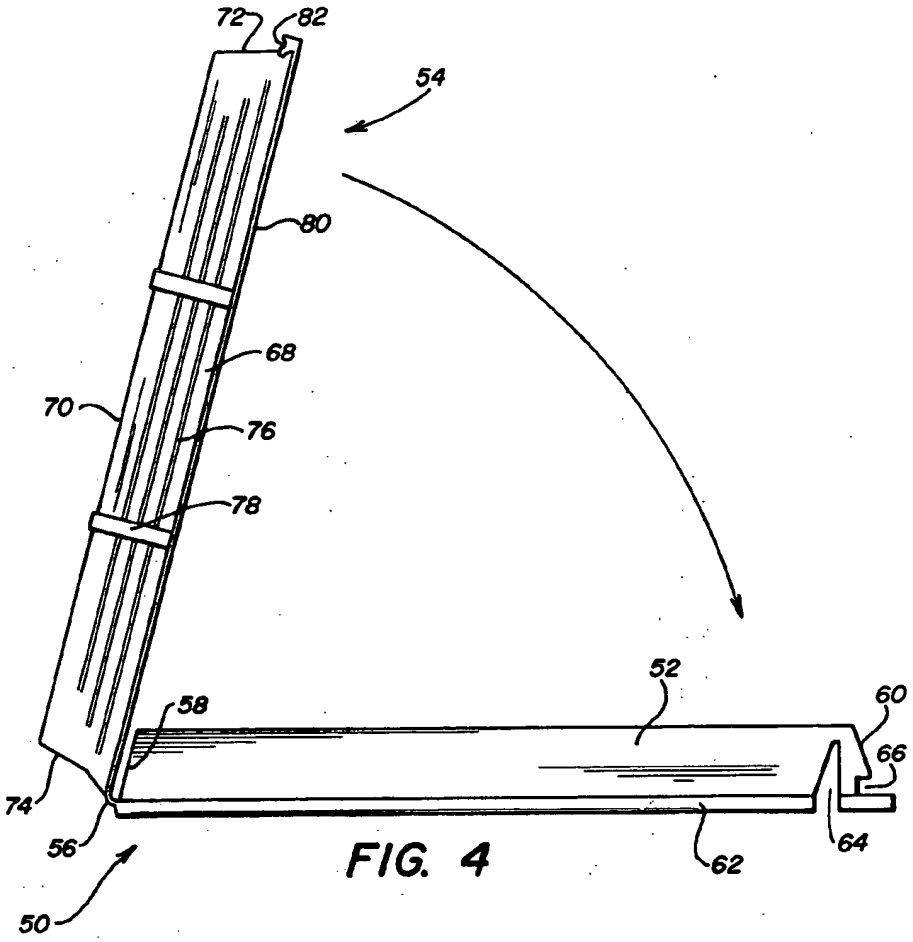


FIG. 4

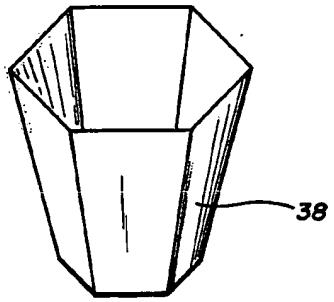


FIG. 5

SMALL ICE PACK

TECHNICAL FIELD

This invention relates to medical devices and more particularly to improvements in small ice packs designed for single patient use.

BACKGROUND ART

Ice packs for single patient use are generally of two types: large general purpose ice packs designed for application to large areas of the body and small, specialized ice packs designed for application of cold locally at particular points. These smaller ice packs, because of their size, typically have small openings, which are difficult to fill from an automatic ice machine or from a scoop from an ice bin, and which often result in the spillage of ice during filling and damage to the disposable ice packs which tend to be of more fragile construction.

Sanitation considerations also limit the use of the ice packs in hospitals and clinics. Many small ice packs, for example, designed for single patient use, must be disposed of after single use due to the likelihood of contamination of the ice machine or scoop with an ice pack which has been in contact with a patient's body, or there is risk for contaminating the ice supply. This is both expensive and wasteful. Accordingly, a need arises for a small, single patient ice pack which can be easily filled and refilled from an automatic ice machine or scoop without contamination of the source of ice and damage to the ice pack. More efficient methods of constructing small ice packs and devices for maximizing single patient use are likewise needed.

DISCLOSURE OF THE INVENTION

In accordance with one aspect of the invention, a refillable, sanitary ice pack for single patient use is disclosed. The ice pack contains a generally rectangular envelope having an open end and a closed end and containing a waterproof bag member formed internally thereof, opening at the open end of the envelope. The envelope is formed of a three ply material containing an inner layer of waterproof material, an intermediate layer of absorbent material, and an outer layer of absorbent material perforated by a multitude of tiny holes. A first pair of tie strings extend longitudinally of the envelope from the open end and a second pair of tie strings extend longitudinally of the envelope from the closed end. A closure member is employed for selectively sealing the bag member after filling with ice. The closure member has a blade-like member and a sheath member hingedly connected thereto for compressing the envelope against the blade-like member when the blade member is inserted into the sheath member.

According to a second aspect of the invention, an ice pack having a generally rectangular envelope is provided having an open end and a closed end and having a waterproof bag member formed internally therein. The bag member is closed on three sides and has an outwardly diverging throat opening at the open end of the envelope. The ice pack has a first pair of tie strings extending longitudinally of the envelope from the open end and a second pair of tie strings extending longitudinally of the envelope from the closed end. A disposable funnel, dimensioned to be inserted into the throat of the bag member, is provided for facilitating the filling of the ice pack. The funnel is dimensioned to converge at its lower end at substantially the same angle as the diverging throat of the bag member. A closure member, dimensioned to be disposed adjacent the open end of the envelope, is provided for selectively sealing the throat of the bag member when filled with ice. The closure member contains a blade-like member and a sheath member hingedly connected thereto. The blade-like member is dimensioned to seal the throat when the envelope is folded over the blade-like member and the blade-like member is enclosed in the sheath member.

According to a third aspect of the invention, a closure member is provided for selectively sealing a small ice pack. The closure member includes a substantially planar elongate blade-like member having inwardly tapered end surfaces and a rib extending substantially the length of the blade-like member along the base thereof. One of the tapered end surfaces contains a notch formed internally thereof and a cut formed in the base proximate the notched surface such that the notched end surface may be compressed inwardly of the blade-like member when the blade-like member is enclosed in the sheath member. The sheath member, dimensioned to receive the blade-like member, is provided with two substantially parallel sidewalls, the sidewalls containing a plurality of longitudinal ribs extending the length thereof. The sidewalls define open, outwardly tapered end surfaces dimensioned to conform substantially to the end surfaces of the blade member, the length of the sheath member being slightly less than the blade member such that the notched end surfaces of the blade-like member are compressed inwardly of the blade-like member when the blade-like member is forced into the sheath member. A flexible member connecting the end surface of the sheath member to the unnotched end surface of the blade-like member is provided to permit the blade-like member to be selectively moved into and out of registration with the sheath member. The sheath member also contains a flange disposed along the base thereof extending outwardly of the end surfaces dimensioned to engage the notched end surface of the blade-like member to lock the blade-like member into registration with a sheath member.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a perspective view of the improved small ice pack, showing the ice pack and clamp in use on the arm of a patient;

FIG. 2 is a plan view of the improved small ice pack showing the bag, the closure member and the funnel inserted in the bag;

FIG. 3 is a magnified section view of the material from which the ice pack is constructed;

FIG. 4 is a plan view of the closure member; and

FIG. 5 is a perspective view of the funnel.

DETAILED DESCRIPTION

FIG. 1 shows the small improved ice pack 10 of the present invention in actual operation. In this particular application, the ice pack is fastened to the arm of a patient by means of a pair of tie strings extending from each end thereof, as shown in greater detail in FIG. 2. A closure member 50 is also shown in its closed operational position whereby it seals the open end of the ice pack.

Referring now to FIG. 2, the small ice pack 10 of the type commonly employed for single patient use in the application of cold to small areas of the body is shown

in greater detail. Ice pack 10 includes a generally rectangular envelope 12 having sides 14 and 16, an open end 18 and a closed end 20. A first pair of tie strings 22 and 24 extend outwardly of open end 18 parallel to sidewalls 14 and 16. A second pair of tie strings 26 and 28 likewise extend outwardly of closed end 20 parallel to sidewalls 14 and 16, but are offset inwardly from the strings 22 and 24 a distance equal to their width to permit construction of another ice pack from the same material with minimum use of fabric in accordance with the method that will be hereafter described.

A waterproof bag 30 made of polyethylene or other inexpensive waterproof material is formed internally of ice pack 10, as shown by the broken line in FIG. 2, bag 30 being sealed along its edges as indicated by the seam 32 and having a throat 34 opening outwardly of open end 18. As best seen in FIG. 2, throat 34 has diverging walls 36 which diverge at substantially the angle of convergence of a disposable funnel 38 employed in connection with the ice pack 10. Disposable funnel 38, shown in phantom in FIG. 2, is inserted in throat 34 to facilitate filling of the bag and to permit refilling of the bag without contaminating the source of ice when the ice pack is brought into direct contact with the source of ice. Substantial correspondence between the tapering walls of funnel 38 and the taper of sidewalls 36 is important for uniform distribution of the load in the funnel since disposable ice packs are typically and preferably made of relatively fragile material subject to tearing and rupture.

FIG. 3 illustrates in magnified cross section, the material from which the ice pack is constructed. The innermost layer of material is a thin sheet of polyethylene 42. Layer 42 is bonded to an intermediate layer of absorbent material 44 which in turn is bonded to an outer layer of absorbent material 46 perforated with a multitude of small holes 48. Holes 48 give the material a wicking effect, permitting evaporation of water condensing in the intermediate layer at the polyethylene interface so that the outside of the ice pack does not become wet and unsuitable for reuse because of condensation. Rayon polyester fiber provides a suitable absorbent material for use in this application.

Ice pack 10 is constructed by positioning strips of three ply material 40 of the type shown in FIG. 3 in overlapping relation. Envelope 12 is first formed by sonically welding the first and second strips together along the seam 49. Next, bag 30 is formed internally of the envelope by sonically welding the two sheets of three ply material together along seam 32. The ice packs are then cut by means of an automatic cutting machine in the pattern shown in FIG. 2, such that tie strings 26 and 28 are offset inwardly of the outer edge permitting tie strings 22*a* and 24*a* of the left adjacent envelope to be simultaneously cut out. Likewise, tie strings 26*b* and 28*b* of the right adjacent envelope are cut out simultaneously with tie strings 22 and 24 to eliminate wasting material between adjacent envelopes.

Referring now to FIG. 4, the closure member 50, employed for sealing the bag after it has been filled with ice, is shown in its operating position in FIG. 2. Closure member 50 contains an elongate blade-like member 52 hingedly connected to an elongate sheath member 54 by means of a flexible element 56, which may be a simple flexible plastic connection.

Blade-like member 52 is a substantially planar elongated member having inwardly inclined end surfaces 58 and 60 and containing a reinforcing rib 62 extending along the base thereof slightly beyond end surfaces 58 and 60. The cut 64 is provided in blade-like member 52 proximate the end surface 60 to provide end surface 60 with inward flexibility upon compression when blade-like member 52 is brought into registration with sheath member 54. A notch 66 is cut into the end surface 60 opposite the hinge to provide a locking structure for engaging latching structure on sheath member 54 when blade-like member 52 is brought into registration therewith.

Sheath member 54 is formed of two substantially planar sidewalls 68 connected together by a roof portion 70 and having open end surfaces over 72 and 74, which permit portions of end surfaces 58 and 60 of blade-like member 52 to extend slightly therefrom. Sheath member 54 has a length slightly less than blade-like member 52 such that some compression of end surface 60 is required to bring blade-like member 52 into registration with sheath member 54. Sheath member 54 has sufficient width between sidewalls 68 such that the envelope may be wrapped around both sides of blade-like member 52 and the blade-like member and envelope compressed into sheath member 54. Longitudinal ribs 76 and vertical ribs 78 may be provided with sidewalls 68 to further enhance the structural integrity of the closure members to render it suitable for multiple use. A flange 80 extends along the base of sidewalls 68 just beyond end surfaces 72 and 74 to define an apertured latching member 82 which cooperates with notch 66 on blade-like member 52 to lock blade-like member 52 into registration with sheath member 54.

In operation, closure member 50 is positioned against one side of ice pack 10, as shown in FIG. 2, adjacent the throat 34, such as by means of a piece of scotch tape, to hold blade-like member 52 into proper position. The outer portion of throat 34 is then folded over blade-like member 52 and blade-like member 52 is brought into registration with sheath member 54. Because sheath member 54 has a width slightly less than blade-like member 52, surface 60 will be compressed as the end surface 72 of sheath member 54 slides therealong to the point where latching member 82 passes into notch 66. At this point, the end surface 60 slips into the aperture in latching member 82 and the compression force on the end surface is released, thereby bringing the latching member 82 and the notch 66 into locking position. Blade-like member 52 is released from sheath member 54 by application of downward pressure to latching member 82, which forces end surface 60 inwardly of the blade-like member 52, thereby permitting sheath member 54 to slide off of end surface 60.

FIG. 5 shows a collapsible funnel 38 adapted to be employed in connection with the ice pack 10. In the preferred embodiment, funnel 38 is hexagonal in cross section and has an angle of convergence substantially the same as the diverging walls of throat 34 in the bag. Funnel 38 can be made of inexpensive water resistant material designed for a single use, such as cardboard. The hexagonal structure permits the funnel to be collapsed relatively flat and inserted into the bag flat prior to filling of the ice pack for ease of shipment and storage. Funnel 38 can be expanded by simple application of pressure thereto around the throat and discarded after use. The use of a polygonal cross sectional structure has also been found to facilitate the flow of ice into throat 34 as it accumulates in the funnel.

The collapsible funnel 38 is designed for a single use and may be opened and inserted in the mouth of ice

pack 10 to prevent contact between the ice machine and scoop and the pack. The funnel is then discarded after use and the closure member is applied to throat 34. If a refilling of ice pack 10 is desired, the closure member may be opened, the contents of the bag poured therefrom and a second funnel 38 inserted therein to permit refilling without bringing the used ice pack into contact with the source of ice.

Ideally, the ice packs may be packaged flat with the funnel 38 inserted into throat 34 and closure member 50 taped to the outside of the ice pack. This provides a convenient means for shipping and storing the ice pack. Additional funnels 38 may be employed in connection with the ice pack to render it adaptable to multiple use for a single patient.

Whereas the present invention has been described with respect to specific embodiments thereof, it is to be understood that various changes and modifications will be suggested to one of ordinary skill in the art and it is intended to encompass such changes and modifications as fall within the scope of the appended claims.

We claim:

1. A refillable sanitary ice pack for single patient use comprising:

a generally rectangular envelope having an open end and a closed end, said envelope containing a waterproof bag member formed internally thereof, said bag member being open adjacent the open end of the envelope, said envelope being formed from a multiple ply material, said material including an inside layer of waterproof material, an intermediate layer of absorbent material and an outside layer of absorbent material perforated by a large number of small apertures to provide a wicking effect to reduce condensation;

a first pair of tie strings extending longitudinally of the envelope from the open end thereof;

a second pair of tie strings extending longitudinally of the envelope from the closed end thereof; and

a closure member for selectively sealing the bag member, said closure member having a blade-like member and a sheath member hingedly connected thereto for compressing said envelope against said blade-like member in said sheath member.

2. The ice pack of claim 1 and further comprising a disposable funnel, wherein said bag member diverges outwardly at the open end of the envelope at substantially the angle of convergence of said funnel.

3. The ice pack of claim 2 wherein said disposable funnel is dimensioned to be inserted into the open end of the envelope in communication with the bag member to facilitate filling of the bag member with ice.

4. The ice pack of claim 3 wherein said funnel is hexagonal in cross section and is capable of being folded relatively flat prior to use.

5. The ice pack of claim 1 wherein said second pair of tie strings are substantially parallel to said first pair and offset inwardly thereof.

6. In combination:

an ice pack having a generally rectangular envelope, said envelope having an open end and a closed end and also having a waterproof bag member formed internally thereof, said bag member being closed on three sides and defining an outwardly diverging throat opening adjacent the open end of said envelope, said ice pack having a first pair of tie strings extending longitudinally of said envelope from said open end and a second pair of tie strings extending longitudinally of said envelope from said closed end;

a disposable funnel dimensioned to be inserted into said throat in communication with said bag member, said funnel converging at its lower end at substantially the same angle as the outwardly diverging throat of said bag member; and

a closure member dimensioned to be disposed adjacent the open end of said ice pack, said closure member having a blade-like member and a sheath member hingedly connected to said blade-like member, said blade-like member dimensioned to seal said throat of said bag member when said envelope is folded over said blade-like member and said blade-like member is enclosed in said sheath member.

7. The combination of claim 6 wherein said funnel is hexagonal in cross section and is capable of being folded relatively flat prior to use.

8. An improved ice pack comprising:

a generally rectangular envelope having an open end and a closed end, said envelope containing a waterproof bag member formed internally thereof, said bag member being open adjacent the open end of the envelope;

a first pair of tie strings extending longitudinally of the envelope from the open end thereof; and

a second pair of tie strings extending longitudinally of the envelope from the closed end thereof, said second pair of tie strings being substantially parallel to said first pair and offset inwardly thereof to an extent equal to the width of said first tie strings to facilitate the economical construction of a plurality of ice packs cut in series from a length of material.

* * * * *

US005641325A

United States Patent [19]

Delk et al.

[11] Patent Number: 5,641,325

[45] Date of Patent: Jun. 24, 1997

[54] **ICE PACK**

[75] Inventors: **Robert E. Delk**, Dallas; **Michael L. Bowen**, Arlington; **Pervez Dagia**, Dallas, all of Tex.

[73] Assignee: **Tecnol, Inc.**, Fort Worth, Tex.

[21] Appl. No.: **314,848**

[22] Filed: **Sep. 29, 1994**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 294,142, Aug. 22, 1994, which is a continuation-in-part of Ser. No. 45,360, Apr. 13, 1993, Pat. No. 5,356,426.

[51] **Int. Cl.**[6] **A61F 7/00**

[52] **U.S. Cl.** **607/108**; 607/112; 607/114; 126/204; 383/501; 62/530

[58] **Field of Search** 383/901; 62/530; 604/332; 126/204; 607/108–112, 114; 215/12.1, 13.1

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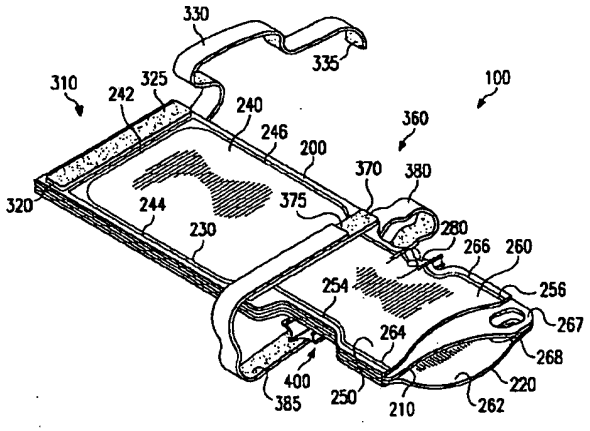
Attorney, Agent, or Firm—Baker & Botts, L.L.P.

[57] **ABSTRACT**

An ice pack having a bag, securement devices, and a clip. The bag has two multi-layer walls which are bonded to form a containment section, a neck, a mouth, and a clip mounting tab. The layers of the bag walls perform various functions for the ice pack. The securement devices have hook strips mounted to the bag and pile straps attached to the bag. The pile straps wrap around the object to which the ice pack is to be applied, and engage the hook strips. The clip includes two plates connected together by a hinge. The elongated hooks are positioned such that the two elongated hooks engage when the plates are rotated about the hinge, and secure the neck of the bag between the two elongated hooks. The inner surfaces of the clip are attached to the clip mounting tab located near the neck of the bag, thereby facilitating the sealing of the bag by the clip.

8 Claims, 6 Drawing Sheets



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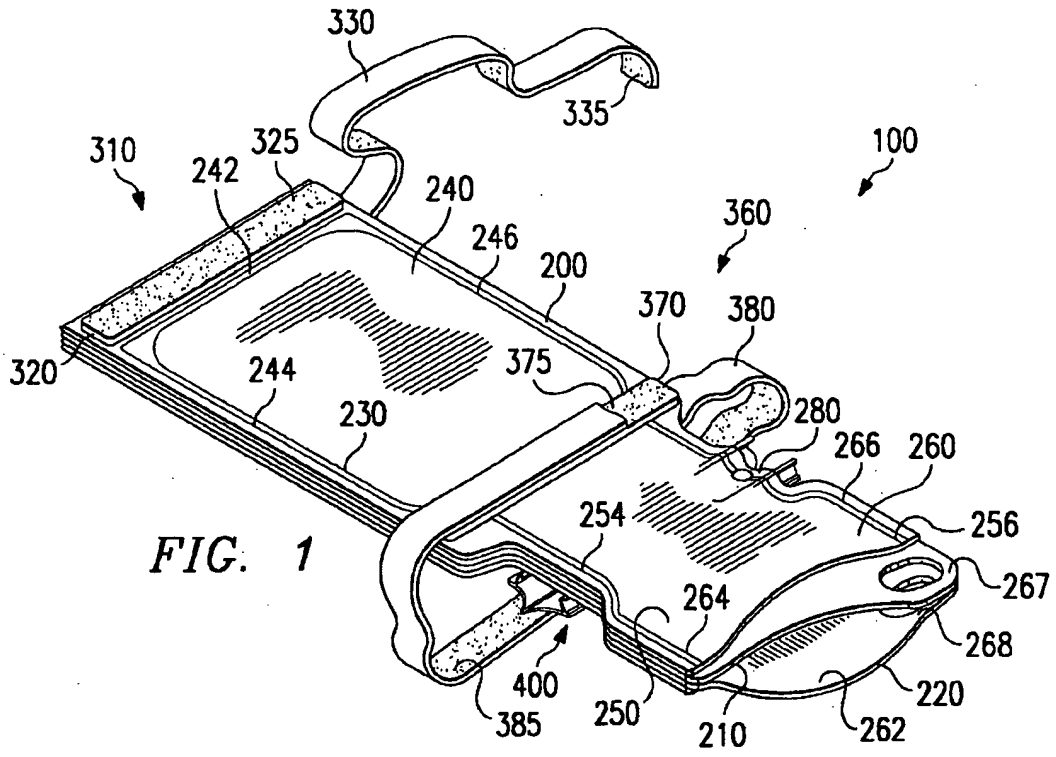
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242
240
246
200
360
100
370
380
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266
260
254
256
267
264
268
400
220
385
250
210
262

FIG. 1

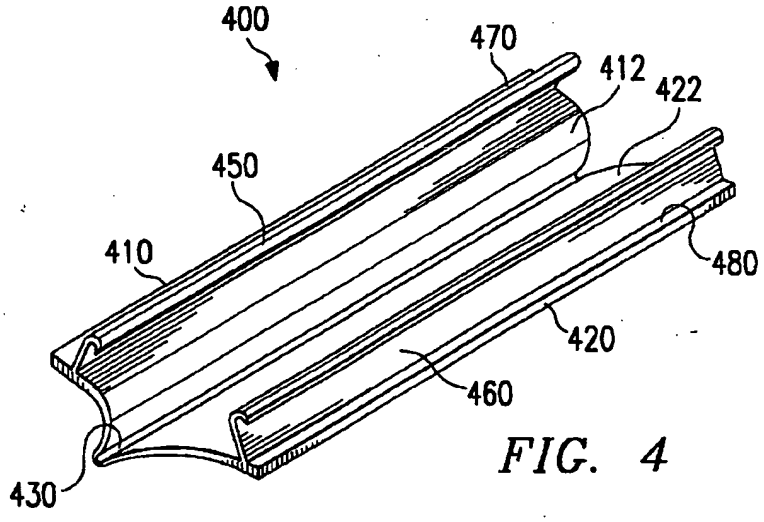

400
470
412
422
450
410
480
420
460
430

FIG. 4

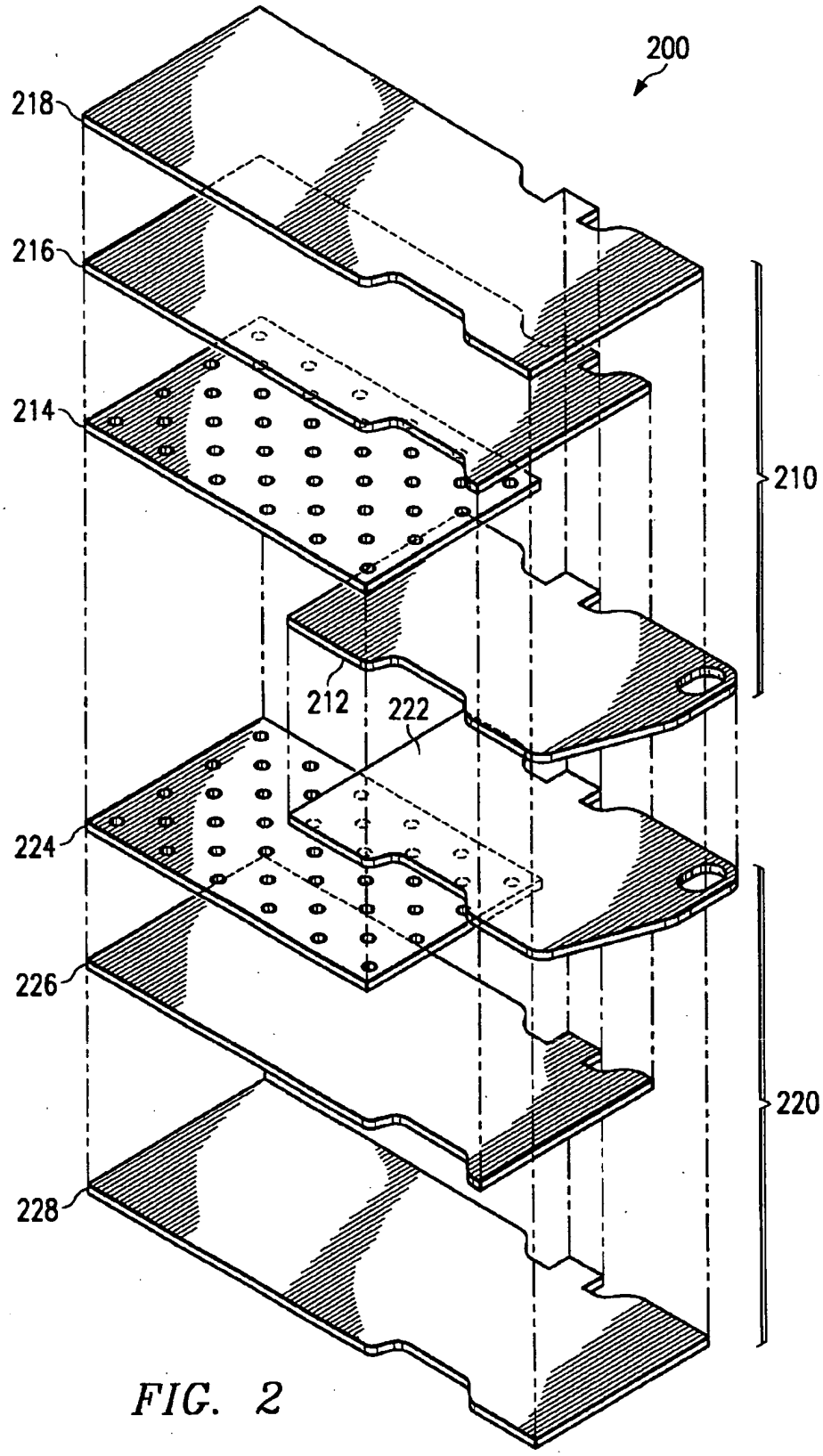


FIG. 2

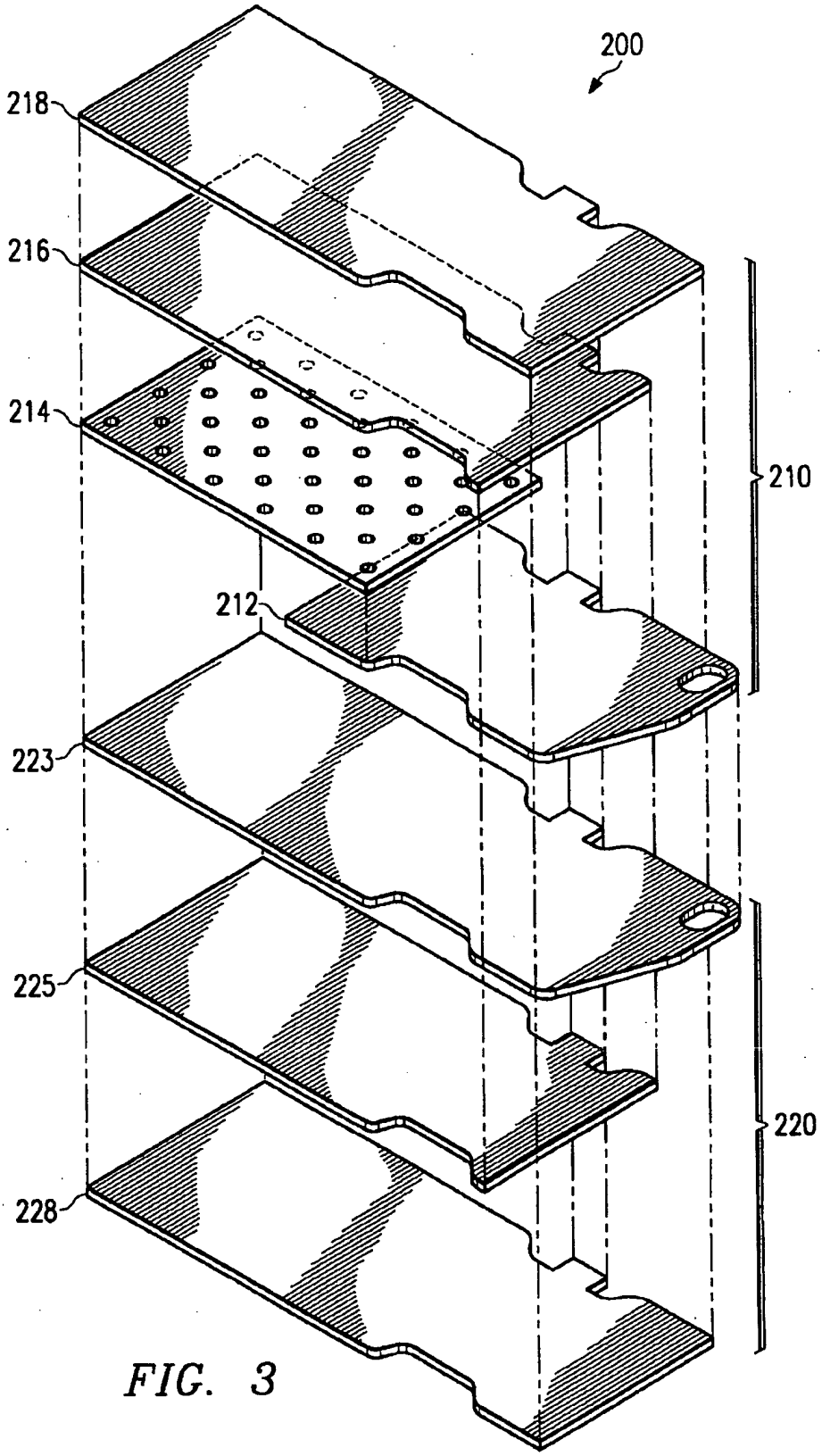
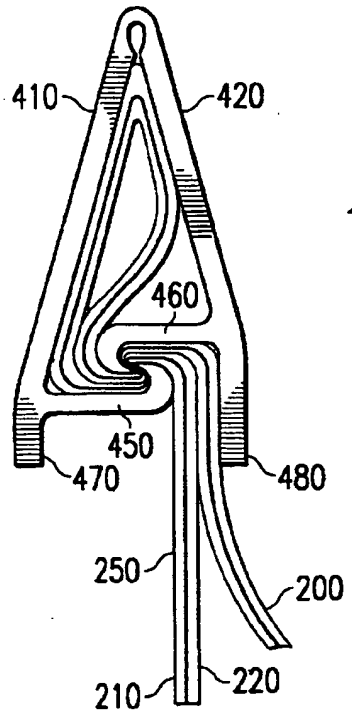


FIG. 3

FIG. 5


410
420
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470
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210
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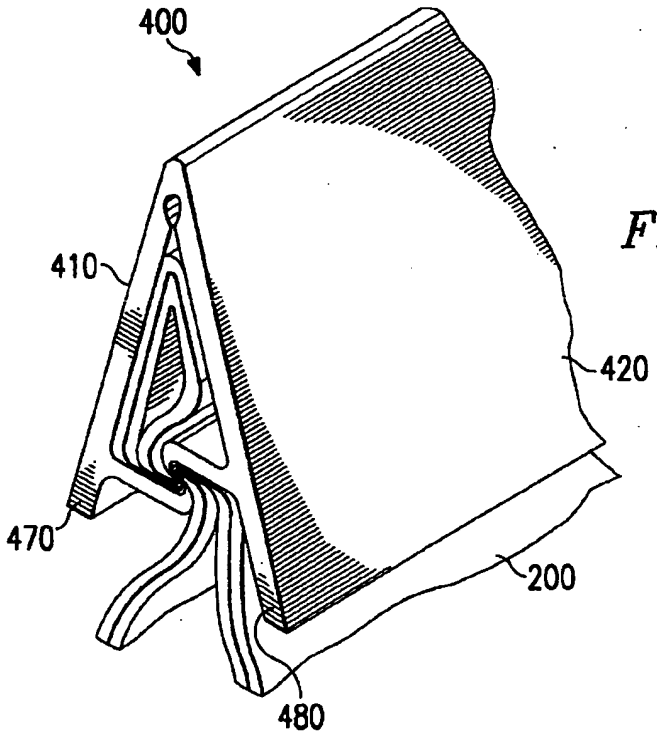
400
410
420
470
200
480

FIG. 6

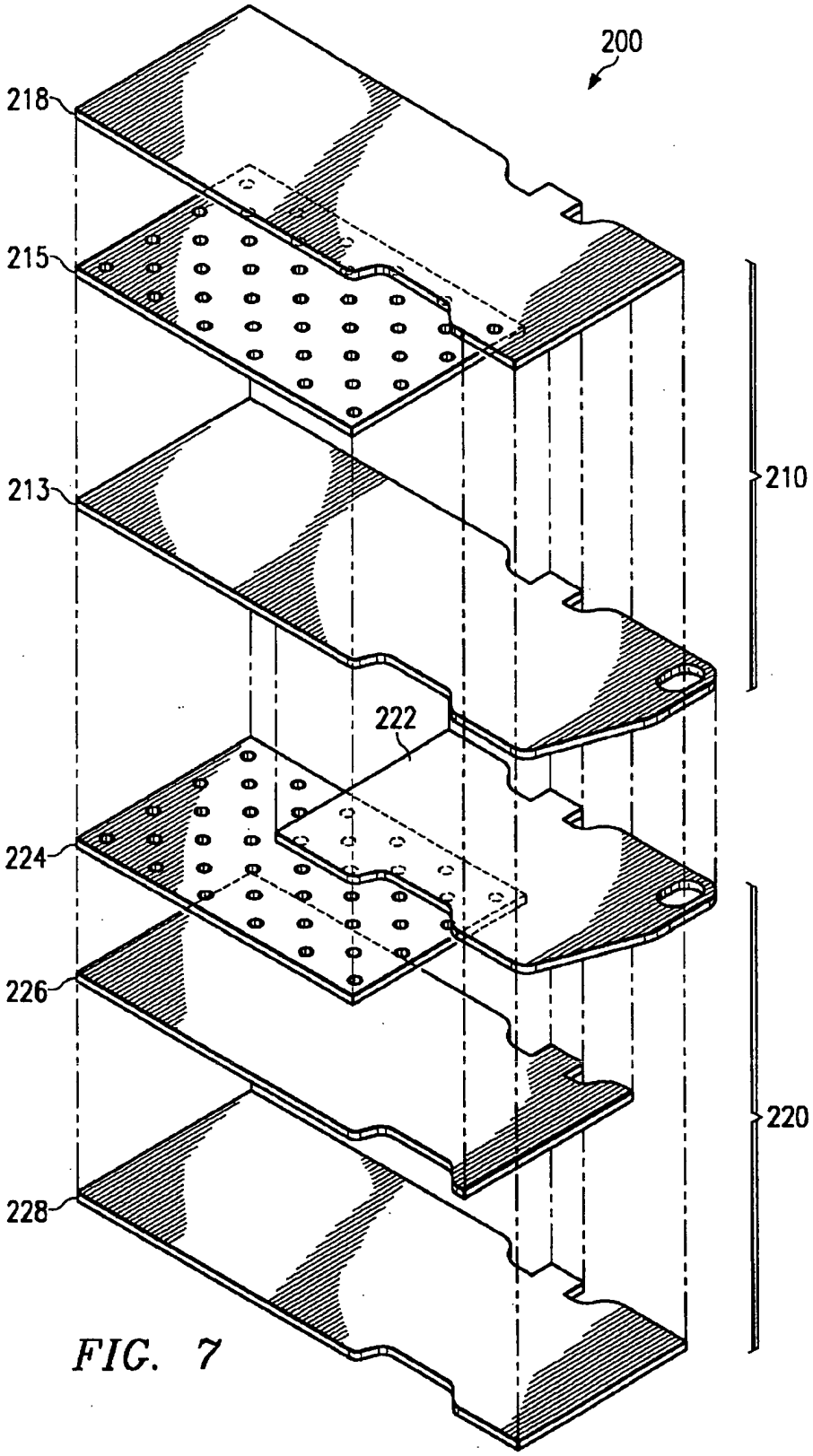

FIG. 7

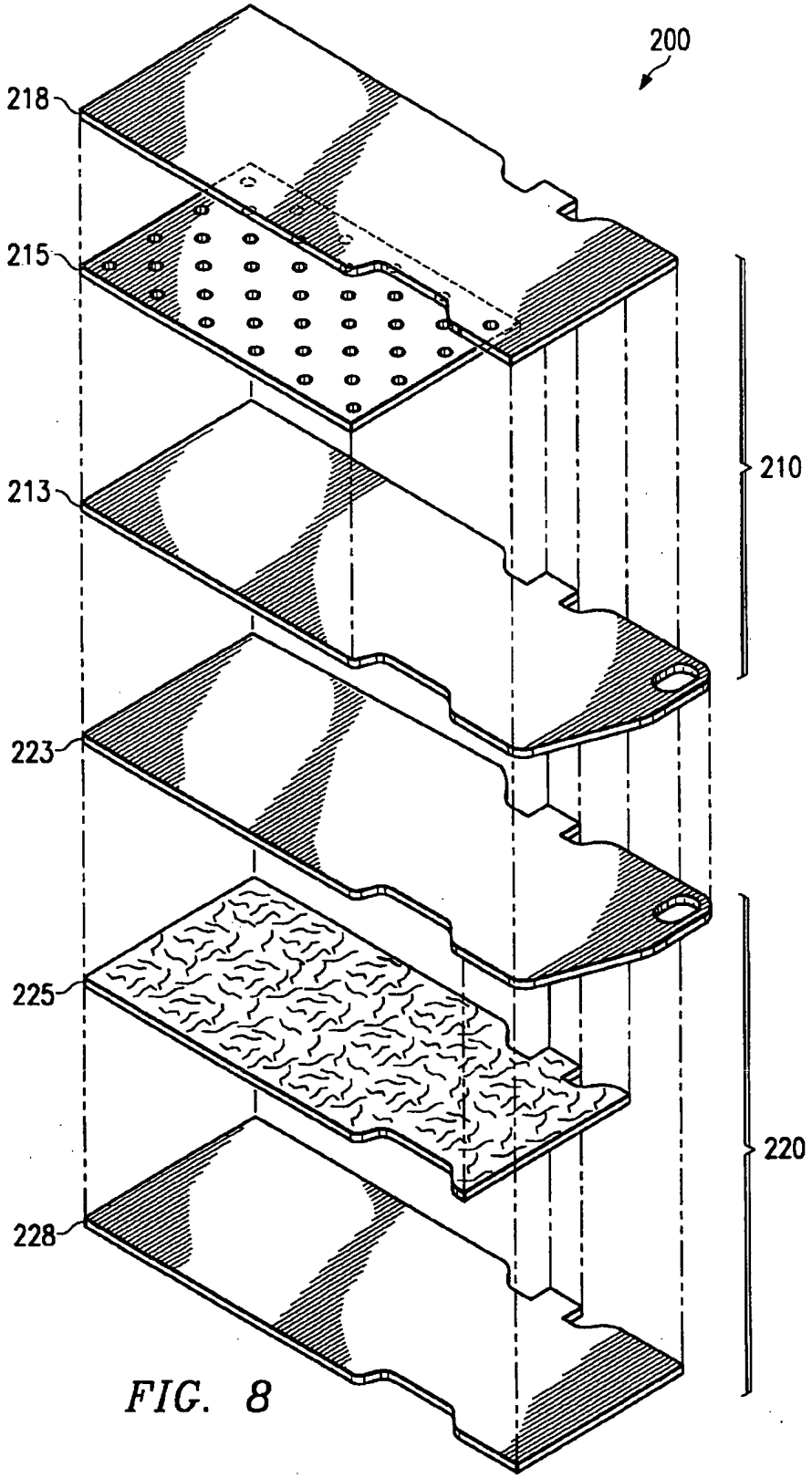

FIG. 8

ICE PACK

This application is a continuation-in-part of application Ser. No. 08/294,142, filed Aug. 22, 1994, pending, which is a continuation-in-part of application Ser. No. 08/045,360, filed Apr. 13, 1993, now U.S. Pat. No. 5,356,426.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to ice packs, and more particularly to ice packs with a bag, a closure component, and components for securing the ice pack.

2. Description of the Related Art

Ice packs are used for cooling various surfaces such as cooling a portion of a patient's body for medical reasons. Ice packs generally have a bag with a containment section, a neck, and a mouth. Ice is inserted into the containment section of the bag through the mouth and neck of the bag. Once ice is inserted into the containment section of the bag, a closure component seals the containment section of the bag and the ice pack is applied to the desired location.

Ice in the containment section of the bag reduces the temperature of the bag for the intended use of the ice pack. However, temperature gradients can exist across the surface of the bag due to the concentration of ice in different areas in the containment section of the bag. Also, it would be an advantage to control the rate at which heat is transferred at the surface of the bag, and to control the temperature of the outer surface of the bag. Therefore, it would be an advantage to provide an ice pack with a bag that can reduce temperature gradients across the surface of the bag, help control the rate of heat exchange at the surface of the bag, and help control the temperature of the outer surface of the bag.

Once the ice has been inserted into the containment section of the bag, it is preferred that the containment section be closed off so that the ice and liquid in the containment section will not run out of the ice pack. Some of the closure components in used prior art ice packs to close off the containment section of a bag include such items as stoppers, clips, etc.

Generally, stoppers block the opening in neck of the bag, thereby preventing ice and liquids from escaping from the containment section of the bag. However, stoppers require a bag with a neck specifically designed for use with the stopper.

In contrast, clips do not require the neck portion of a bag to be specifically designed for use with the clip. A clip closes off the containment section of a bag by applying force to the external surfaces of the neck. The forces on the external surfaces of the neck force together the internal surfaces of the neck, thereby closing off the containment section of the bag.

Because the clip is a separate component from the bag of an ice pack, it is desirous to attach the clip to the bag. Attaching the clip to the bag prevents the loss of the clip, and searching to find a clip each time a ice pack is used. Typically, the clip will be attached to the bag at the location on the neck which the clip is intended to engage and seal.

However, various types of prior art clips, and the method of attaching those clips, are such that it is possible to close the clip without securing and sealing the neck of the ice bag. Therefore, there is a need for an ice pack having a clip which will facilitate closing the clip with the neck of the bag engaged in, and sealed by, the clip.

After the bag of the ice pack has been filled with ice and closed off by a closure component, the ice pack is applied to the desired surface. In prior art ice packs, tie strings have been attached to the bag in a longitudinal direction. The tie strings are wrapped around the object on which the ice pack is applied, and a knot is tied in the tie strings to secure the ice pack thereon.

However, it is difficult for a user to tie a knot in the tie strings when the user is applying the ice pack to the user's own body. Also, it is difficult to adjust the firmness with which the tie strings secure the ice pack to the applied area. Therefore, there is a need for an ice pack which can be easily attached and adjusted on the object being cooled.

SUMMARY

In one embodiment, the present invention is an ice pack which includes a bag having a first side wall welded to a second side wall to form a containment section, a neck, and a mouth. In one aspect, a first side wall includes a waterproof layer disposed in the area of the first side wall which forms the containment section, the neck, and the mouth, and includes an insulation layer disposed over the waterproof layer and in the area of the first side wall which forms the containment section of the bag. In a further aspect, a second side wall includes: a throat piece disposed in the area of the second side wall which forms the mouth, the neck, and an upper portion of the containment section; an insulation layer disposed over the throat piece and in the area of the second side wall which forms the containment section; and a waterproof layer disposed over the insulation layer and in the area of the second side wall which forms the containment section and an upper portion of the neck. In another further aspect, a second wall includes a waterproof layer disposed in the area of the second side wall which forms the containment section, the neck, and the mouth, and includes a relief layer disposed over the waterproof layer and in the area of the second side wall which forms the containment section. In another aspect, the side walls have an insulation layer disposed inside of a waterproof layer. In another aspect, the side walls have a throat element disposed in the area of the walls which form the neck and an upper portion of the containment section, an insulation layer disposed in the area of the walls which forms the containment section, and a waterproof layer disposed in the area of the walls which form the containment section and a lower portion of the neck. In a further aspect, the insulation layer in one of the walls is perforated with a plurality of holes. In yet a further aspect, the insulation layer in both walls is perforated with a plurality of holes. In yet a further aspect, the holes in the insulation layer of one of the walls is larger than the holes in the insulation layer of the other wall. In another further aspect, the insulation layer of one of the walls has more holes per square area than the insulation layer of the other wall. In another aspect, each of the walls includes a barrier layer which is disposed over the waterproof layer and in the area of the walls which forms the containment section and the neck section. In another aspect, the bag includes a mouth having a first handle which is formed in one of the side walls, and a second handle which is formed in the other side wall.

In another embodiment, the present invention includes a bag having a containment section, a neck, a mouth, and a clip. The clip has a first plate connected to a second plate by a hinge so that an inner surface of the first plate rotates toward an inner surface of the second plate. The clip also has a first elongated hook and a second elongated hook extending from the inner surfaces of the first plate and the second plate, respectively, so that the first elongated hook engages and secures with the second elongated hook when the inner

surfaces of the first plate and the second plate are rotated towards each other. The neck of the bag is secured between the engaged first and second elongated hooks, thereby sealing the bag. In a further aspect, the clip is attached to the bag of the ice pack. In yet a further aspect, the inside surface of the first plate of the clip is attached to the neck of the bag.

In another embodiment, the present invention includes a bag having a containment section, a neck, a clip mounting tab, and a clip for securing the neck of the bag closed. The clip is attached to the clip mounting tab of the bag. In a further aspect, the bag has a clip mounting tab which is attached to the clip. In yet a further aspect, the clip mounting tab is mounted to the inside surface of the first plate of the clip.

In another embodiment, the present invention includes a bag having a first securement device. The first securement device has a first means for engaging mounted on the bag, a strap attached to the bag, and a second means for engaging mounted on the strap. The second means for engaging is adapted to engage with and secure to the first means for engaging. In a further aspect, the present invention includes a second securement device having a first means for engaging mounted to the bag, a strap attached to the bag, and second means for engaging mounted to the strap and adapted to engage and secure with the first means for attaching of the second securement device. In yet a further aspect of the invention, the first means for attaching and the second means for attaching of the first securement device are components of a hook and pile type fastener. In yet a further aspect of the present invention, the first means for attaching and the second means for attaching of the second securement device are components of a hook and pile type fastener.

BRIEF DESCRIPTION OF DRAWINGS

For a more complete understanding of the present invention, and for further objectives and advantages thereof, reference may now be taken in conjunction with the accompanying drawings herein:

FIG. **1** is a perspective view of an embodiment of the present invention illustrated as an ice pack;

FIG. **2** is an exploded perspective view of an embodiment of the bag from FIG. **1**;

FIG. **3** is an exploded perspective view of an alternate embodiment of the bag from FIG. **1**;

FIG. **4** is a perspective view of an embodiment of the clip from FIG. **1**;

FIG. **5** is a partial side view of the ice pack from FIG. **1**, illustrating the bag from FIG. **1** being closed by the clip from FIG. **4**;

FIG. **6** is a partial perspective view of the ice pack from FIG. **1**, illustrating the bag from FIG. **1** being closed by the clip from FIG. **4**; and

FIG. **7** is an exploded perspective view of an alternate embodiments of the bag from FIG. **1**;

FIG. **8** is an exploded perspective view of an alternate embodiment of the bag from FIG. **1**;

DETAILED DESCRIPTION

Referring first to FIG. **1**, there is shown a perspective view of an embodiment of the present invention, illustrated as an ice pack **100**. The ice pack **100** generally comprises a bag **200**, securement devices **310** and **360**, and a clip **400**.

Still referring to FIG. **1**, the bag **200** has a first side wall **210** and a second side wall **220** joined together by a weld **230** to form a containment section **240**, a neck **250**, a mouth **260**, and a clip mounting tab **280**. As illustrated, the containment section **240** is a generally rectangular shape with a bottom **242**, a first side **244**, and a second side **246**. However, the containment section **240** can be alternative shapes such as oval or any other shape which can contain the ice and liquids therein. The neck **250** has a first side **254** and a second side **256** which extend from the sides **244** and **246**, respectively, of the containment section **240** to the mouth **260** of the bag **200**. The first and second side **254** and **256** form a passage or throat in the inside of the neck **250** which communicates with the interior of the containment section **240**. The mouth **260** has a first side **264** and a second side **266** which extend from the first and second side **254** and **256** of the neck **250**, respectively, to an opening **262**. The opening **262** of the mouth **260** communicates with the interior or throat of the neck **250**. The mouth **260** of the bag **200** also has a first handle **267** and a second handle **268** disposed on the walls **210** and **220**, respectively, in the area of the opening **262**. The clip mounting tab **280** is preferably located adjacent to the neck **250**. Although the mouth **260** has been illustrated herein as larger than the neck **250**, in another construction the mouth **260** can be the same size or smaller than the neck **250**. Furthermore, although the containment section **240** has been illustrated herein as larger than the neck **250**, in yet another construction the containment section **240** can be the same size or smaller than the neck **250**.

Referring now to FIG. **2**, there is illustrated an exploded perspective view of an embodiment of the bag **200** from FIG. **1**. The containment section **240**, the neck **250**, and the mouth **260** of the bag **200** in FIG. **1** are formed by joining the first side wall **210** to the second wall **220** with the weld **230** in FIG. **1**. The first side wall **210** is a multilayered material having a throat element **212**, a first layer or insulation layer **214**, a waterproof layer **216**, and an outer barrier layer **218**. Likewise, the second wall **220** has a throat element **222**, a first layer or insulation layer **224**, an waterproof layer **226**, and an outer barrier layer **228**.

Still referring to FIG. **2**, the throat elements **212** and **222** are disposed in the area of the walls **210** and **220**, respectively, which form the neck **250** and the mouth **260** of the bag **200** in FIG. **1**. The throat elements **212** and **222**, also cover a portion of the walls **210** and **220**, respectively, in an upper portion of the containment section **240** of the bag **200** in FIG. **1**. Also, handles **267** and **268** are formed on the throat elements **212** and **222**, respectively. The throat elements **212** and **222** are preferably formed of polyethylene or other waterproof material. However, because the throat elements **212** and **222** do not contact the ice and liquids for an extended period of time, it is not necessary that the throat elements **212** and **222** be formed of a waterproof material.

Referring still to FIG. **2**, the insulation layers **214** and **224** are disposed over the throat elements **212** and **222**, respectively, in the area of the walls **210** and **220** which form the containment section **240** of the bag **200** in FIG. **1**. The insulation layers **214** and **224** control the heat transfer rate and temperature of the walls **210** and **200**. The insulation layers **214** and **224** are preferably formed of a foam or other insulation material. In the illustrated embodiment of the invention, the insulation layers **214** and **224** are a closed cell foam perforated with holes. The size and density of the holes in the insulation layers are selected to provide a specific heat transfer rate and select temperature for the walls **210** and **220**. Preferably, the size and density of holes in the insulation layer **214** are different from the size and density of the holes in the insulation layer **224**, thereby causing the first

side wall 210 to have a different heat transfer rate and temperature than the second side wall 220. In another construction, only one of the insulation layers 214 and 224 of the walls 210 and 220, respectively, is perforated with holes. The absence of holes in the insulation layer of one of the walls 210 or 220 will cause the wall without holes to transfer heat at a slower rate and have a higher temperature than the other wall. In another construction, the insulation layer 214 of the first side wall 210 is a different thickness than the insulation layer 224 of the second side wall 220, thereby causing the first side wall 210 to have a different heat transfer rate and temperature than the second side wall 220. In yet another construction, the insulation layer 214 of the first side wall has a different thermal conductivity than the insulation layer 224 of the second side wall 220, thereby causing the first side wall 210 to have a different heat transfer rate and temperature than the second side wall 220.

Still referring to FIG. 2, the waterproof layers 216 and 226 are disposed over the insulation layers 214 and 224, respectively, in the area of the walls 210 and 220 which form the containment section 240 of the bag 200 in FIG. 1. The waterproof layers 216 and 226, also cover a portion of the walls 210 and 220, respectively, in a lower portion of the neck 250 of the bag 200 in FIG. 1. The waterproof layers 216 and 226 are preferably formed of polyethylene or other waterproof material.

Referring still to FIG. 2, it can be seen that in the area of the neck 250, the throat elements 212 and 222 overlap with the waterproof layers 216 and 226, respectively in the area of the walls 210 and 220 which form the neck 250. The throat elements 212 and 222 are sealed to the respective waterproof layers 216 and 226 in this overlapping area of the neck 250 by ultrasonic welding, chemical bonding, or the like. In this manner the throat elements 212 and 222 and the waterproof layers 216 and 226 will contain the ice and liquid inside the bag 200 of FIG. 1. In another construction, the waterproof layers 216 and 226 are disposed in an area of the walls 210 and 220, respectively, that covers a sufficient area of the neck 250 that the clip 400 (shown in FIG. 1) will seal the waterproof layers 216 and 226. In another construction, the throat element 212 and the waterproof layer 216 of the first side wall 210 are bonded to the insulation layer 214 of said first side wall 210 in the area which forms the neck 250, and the throat element 222 and the waterproof layer 226 of the second side wall 220 are bonded to the insulation layer 224 of the second side wall 220 in the area which forms the neck 250, thereby containing the ice and liquid inside the bag 200 of FIG. 1. In another construction, the insulation layer 214 of the First side wall 210 is bonded to the waterproof layer 216 of the first side wall, thereby regulating the space for ice and liquid to accumulate between the insulation layer 214 and the waterproof layer 216. In yet another construction, the insulation layer 224 of the second side wall 220 is bonded to the waterproof layer 226 of the second side wall 220, thereby regulating the space for ice and liquid to accumulate between the insulation layer 224 and the waterproof layer 226.

Still referring to FIG. 2, the barrier layers 218 and 228 are disposed over the waterproof layers 216 and 226, respectively, in the area of the walls 210 and 220 which form the containment section 240, the neck 250, and the mouth 260, excluding the handles 267 and 268. The barrier layers 218 and 228 reduce the amount of moist air contacting the waterproof layers, reduce the amount of any moisture which may condense on the waterproof layers from contacting the user, and provide a surface texture for the user which is more pleasant than the waterproof layers. The barrier layers 218 and 228 are preferably formed of a spun polyester material or the like.

Referring now to FIG. 3, there is illustrated an exploded perspective view of another construction of the bag 200 from FIG. 1. The containment section 240, the neck 250, and the mouth 260 of the bag 200 in FIG. 1 are formed by joining the first side wall 210 to the second side wall 220 with the weld 230 in FIG. 1. As previously shown in reference to FIG. 2, the first side wall comprises the throat element 212, the first layer or insulation layer 214, the waterproof layer 216, and the barrier layer 218. However, the second side wall 220 comprises a waterproof layer 223, a relief layer 225, and the barrier layer 228.

Still referring to FIG. 3, the waterproof layer 223 is disposed in the area of the wall 220 which forms the containment section 240, the neck 250, and the mouth 260 of the bag 200 in FIG. 1. Also, handle 268 is formed on the waterproof layer 223 in the area of the opening 262 of the mouth 260 in FIG. 1 of the bag 200. The waterproof layer 223 is preferably formed of polyethylene or other waterproof material. In this manner, the waterproof layer 223 combined with the throat element 212 and the waterproof layer 216 will contain the ice and liquid inside the bag 200 of FIG. 1.

Referring still to FIG. 3, the relief layer 225 is disposed over the waterproof layer 213, and in the area of the wall 220 which forms the containment section 240 of the bag 200 in FIG. 1. The relief layer 225 also covers a portion of the wall 220 in a lower portion of the neck 250 of the bag 200 in FIG. 1. The relief layer 225 is preferably formed of polyethylene or other material. The relief layer 225 has a surface texture with many rises and recesses. The rises and recesses of the relief layer 225 reduce the amount of smooth flat surface. Smooth surfaces facilitate the formation and spread of condensation on a layer, while surfaces with relief or texture will retard the spread of condensation. Also, the rises and recesses of the relief layer 225 form air pockets which facilitate insulation of the side wall 220. The insulation provide by the relief layer 225 controls the heat transfer rate and temperature of the side wall 220. The insulation provided by the relief layer 225 also helps control the rate at which the side wall 220 initially reaches the desired temperature. By controlling the rate at which the side wall 220 reaches the desired temperature, condensation can be reduced which is caused by the side wall 220 reaching the desired temperature too quickly. The rises and recesses of the relief layer 225 can be formed by casting, embossing, or other like methods of forming rises and recesses in the relief layer 225. Alternatively, the relief layer 225 is formed of a material such as "bubble pack", having rises and recesses formed around pockets in the material.

Still referring to FIG. 3, the barrier layer 228 is disposed over the relief layer 225, and in the area of the wall 220 which forms the containment section 240, the neck 250, and the mouth 260, excluding the handle 268. The barrier layer 228 reduces the amount of moist air contacting the relief layer 225, reduces the amount of any moisture which may condense on the relief layer from contacting the user, and provides a surface texture for the user that is more pleasant that the relief layer 225.

Referring now to FIG. 7, there is illustrated an exploded perspective view of another construction of the bag 200 from FIG. 1. The containment section 240, the neck 250, and the mouth 260 of the bag 200 in FIG. 1 are formed by joining the first side wall 210 to the second side wall 220 with the weld 230 in FIG. 1. The first side wall comprises a waterproof layer 213, an insulation layer 215, and the barrier layer 218. The second side wall 220 comprises the throat element 222, the first layer or insulation layer 224, the waterproof

layer 226, and the barrier layer 228, as shown and described in reference to FIG. 2.

Still referring to FIG. 7, the waterproof layer 213 is disposed in the area of the wall 210 which forms the containment section 240, the neck 250, and the mouth 260 of the bag 200 in FIG. 1. Also, handle 267 is formed on the waterproof layer 213 in the area of the opening 262 of the mouth 260 in FIG. 1 of the bag 200. The waterproof layer 213 is preferably formed of polyethylene or other waterproof material. In this manner, the waterproof layer 213 of the first side wall 210 will act in combination with the throat element 222 and the waterproof layer 226 of the second side wall 220 to contain the ice and liquid inside the bag 200 of FIG. 1.

Referring still to FIG. 7, the insulation layer 215 is disposed over the waterproof layer 213 in the area of the wall 210 which forms the containment section 240 of the bag 200 in FIG. 1. The insulation layer 215 controls the heat transfer rate and temperature of the wall 210. The insulation layer 215 is preferably formed of a foam or other insulation material. The insulation layer 215 is preferably bonded to the waterproof layer 213 over the entire surface of the insulation layer 215; however, the insulation layer 215 can be bonded to the waterproof layer 213 in only select locations, such as the weld 230 in FIG. 1. In the illustrated embodiment of the invention, the insulation layer 234 is a closed cell foam perforated with holes. The size and density of the holes in the insulation layer 215 are selected to provide a specific heat transfer rate and select temperature for the wall 210. In another construction, the insulation layer 215 is a closed cell foam which is not perforated with holes. In yet another construction, the thickness of the insulation layer 215 is selected to provide a specific the heat transfer rate and temperature for the first side wall 210. In yet another construction, the thermal conductivity of the insulation layer 215 is selected to provide a specific the heat transfer rate and temperature for the first side wall 210. Preferably, the insulation layer 215 causes the first side wall 210 to have a different heat transfer rate and temperature than the second side wall 220.

Still referring to FIG. 7, the barrier layer 218 is disposed over the insulation layer 215, and in the area of the wall 210 which forms the containment section 240, the neck 250, and the mouth 260, excluding the handle 267. The barrier layer 218 reduces the amount of moist air contacting the insulation layer 215, reduces the amount of any moisture which may condense on the insulation layer 215 from contacting the user, and provides a surface texture for the user that is more pleasant that the insulation layer 215.

Referring now to FIG. 8, there is illustrated an exploded perspective view of another construction of the bag 200 from FIG. 1. The containment section 240, the neck 250, and the mouth 260 of the bag 200 in FIG. 1 are formed by joining the first side wall 210 to the second side wall 220 with the weld 230 in FIG. 1. The first side wall comprises the waterproof layer 213, the insulation layer 215, and the barrier layer 218, as shown and described in reference to FIG. 7. The second side wall 220 comprises the waterproof layer 223, the relief layer 225, and the barrier layer 228, as shown and described in reference to FIG. 3.

Referring now to FIGS. 1, 2, 3, 7, and 8 in combination, it can be seen how the bag 200 is formed. The layers of the walls 210 and 220 are positioned and trimmed to the desired shape of the bag 200. In the process of trimming the walls 210 and 220, a section of the material is left with the walls 210 and 220 near the throat 256 of the neck 250 for forming the clip mounting tab 280. The positioned and trimmed layers of the walls 210 and 220 are then bonded together by the weld 230. The weld 230 progresses around the walls 210 and 220 to form the containment section 240, the neck 250, and the mouth 260 of the bag 200. The weld 230 can be a sonic weld, heat weld, or bonding method, such as glue, or the like.

Still referring to FIGS. 1, 2, 3, 7 and 8 in combination, the layers of the walls 210 and 220 are bonded together in the area of the of the clip mounting tab 280 by sonic welding, heat welding, or chemical bonding, or the like. By bonding the layers of the walls 210 and 220 together, the clip mounting tab 280 presents a surface which facilitates mounting the clip 400 thereon. Although the clip mounting tab 280 has been illustrated as being an integral part of the walls 210 and 220, the clip mounting tab 280 could be a separate component which is mounted to the walls 210 and 220 of the bag 200. Furthermore, although the clip mounting tab 280 is illustrated as being positioned on the side of the neck 250, the clip mounting tab 280 could be located on any area of the bag 200.

Referring back now to FIG. 1, the securement devices 310 and 360 each include a hook strip 320 and 370, respectively, and a pile strap 330 and 380, respectively. The hook strips 320 and 370 have hook surfaces 325 and 375, respectively, which are a closely spaced apart multiplicity of hook-like members. The pile straps 330 and 380 have pile surfaces 335 and 385 with loose loops of filament fibers which are designed to cooperate with the hooks in the hook surfaces 325 and 375 in the hook strips 320 and 370, respectively. The hook surfaces 325 and 375 of the hook strips 320 and 370, respectively, engage the pile surfaces 335 and 385 of the hook strips 330 and 380, respectively, in the manner of the well known hook-and-pile fasteners.

Still referring back to FIG. 1, the hook strip 320 is mounted on the first wall 210 near the bottom 242 of the containment section 240, with the hook surface 325 facing away from the first wall 210. The pile strap 330 is mounted on the second wall 220 near the bottom 242 of the containment section 240, with the pile surface 335 facing away from the second wall 220. The pile strap 330 has a sufficient length to pass around an object that the ice pack 100 is to be applied, and engage the hook strip 320.

Referring back still to FIG. 1, the hook strip 370 is mounted on the first wall 210 near the intersection of the containment section 240 and the neck 250, with the hook surface 375 facing away from the wall 210. The pile strap 380 is mounted on the second wall 220 near the intersection of the containment section 240 and the neck 250, with the pile surface 385 facing away from the second wall 220. The pile strap 380 has a sufficient length to pass around an object that the ice pack 100 is to be applied, and engage the hook strip 370.

Still referring back to FIG. 1, although the securement device 310 has been illustrated with the hook strip 320 mounted to the first wall 210 and the pile strap 330 mounted to the second wall 220, the hook strip 320 can be mounted to the second wall 220 and the pile strap 330 mounted to the first wall 210, or both the hook strip 320 and the pile strap can be mounted to the same wall of the bag 200. Similarly, the hook strip 370 can be mounted to the second wall 220 and the pile strap 330 mounted to the first wall 210, or both the hook strip 370 and the pile strap 330 can be mounted to the same wall of the bag 200. Also, although the securement devices 310 and 360 have been illustrated as members of a hook and pile fastener, any other similar engaging means can be used such as buttons, snaps, or the like.

Referring now to FIG. 4, there is shown a perspective view of an embodiment of the clip 400 from FIG. 1. The clip 400 generally comprises a first plate 410 pivotally connected to a second plate 420 by a hinge 430. The clip 400 can be formed of a resilient plastic, or the like. The first plate 410 and the second plate 420 have an inner surface 412 and an inner surface 422, respectively. The first plate 410 and the second plate 420 are connected to the hinge 430 such that the inner surface 412 of the first plate 410 rotates to face the inner surface 422 of the second plate 420.

Referring still to FIG. 4, an elongated hook 450 extends outwardly from the inner surface 412 of the first plate 410. Likewise, an elongated hook 460 extends outwardly from the inner surface 422 of the second plate 420. The elongated hook 450 and the elongated hook 460 are positioned on the first plate 410 and the second plate 420, respectively, such that when the first plate 410 and the second plate 420 are rotated towards each other about the hinge 430, the elongated hook 450 and the elongated hook 460 engage. The elongated hooks 450 and 460 can also be located on the first plate 410 and the second plate 420, respectively, such that grip portions 470 and 480 of the first plate 410 and the second plate 420, respectively, provide sufficient area for a user to grasp the handles 470 and 480 for opening the clip 400.

Referring now to FIG. 1 and FIG. 4 in combination, it can be seen how the clip 400 attaches to the bag 200. The clip mounting tab 280 of the bag 200 is positioned on the inner surfaces 412 and 422 of the clip 400 so that the neck 250 of the bag 200 is centered within the clip 400. After positioning the clip 400, the clip 400 is attached to the clip mounting tab 280 of the bag 200 by sonic welding, hot glue, bonding, an adhesive strip, a fastener, or the like. Although the ice pack 100 has been illustrated with the clip 400 attached to the clip mounting tab 280 of the bag 200, the clip 400 could also be attached directly to any portion of the walls 210 and 220 in the area of the neck 250. Furthermore, although the bag 200 is illustrated as being attached to the inner surfaces 412 and 422 of the clip 400, the bag 200 could be attached to any area of the clip 400. In another construction, the clip 400 could be attached to the bag 200 by tape or a similar means for attaching.

Referring now to FIG. 5, there is shown a partial side view of the ice pack 100 from FIG. 1, illustrating the bag 200 being closed by the clip 400. As illustrated, the first plate 410 and the second plate 420 of the clip 400 are rotated to a position where the elongated hooks 450 and 460 are engaged. The walls 210 and 220 of the bag 200 are folded over in the area of the neck 250 and are positioned between the elongated hooks 450 and 460 of the clip 400. The force of the elongated hooks 450 and 460 engaging each other will apply a force to the exterior of the walls 210 and 220 of the bag 200, which will force the interior surfaces of the walls 210 and 220 together and prevent ice and liquids in the containment section 240 of the bag 200, in FIG. 1, from escaping through the neck 250 and the mouth 260 of the bag 200.

Referring now to FIG. 6, there is shown a partial perspective view of the ice pack 100 from FIG. 1, illustrating the bag 200 being closed by the clip 400. As illustrated, the first plate 410 and the second plate 420 of the clip 400 are contoured at a first end 470 and a second end 480 of the clip 400. The contour of the first plate 410 and the second plate 420 is such that sharp corners are reduced at the first end 470 and the second end 480 of the clip 400 when the clip 400 is in the closed position. The reduction of sharp corners on the clip 400 prevents injury to the user.

Referring now to FIGS. 1–8 in combination, it can be seen how the ice pack 100 of the present invention is utilized. Ice is inserted into the bag 200 through the opening 262 in the mouth 260 of the bag 200. The throat elements 212 and 222 extend below the insulation layers 214 and 222 into the containment section 240 of the bag 200, thereby allowing ice and liquids pass into the containment section 240 of the bag 200 without obstruction by the insulation layers 214 and 224. After sufficient ice is placed within the containment section 240 of the bag 200, any air in the containment section 240 can be kneaded out through the opening 262 in the mouth 260 of the bag 200.

Still referring to FIGS. 1–8 in combination, the neck 250 of the bag 200 is positioned completely within the clip 400 by gently pressing the neck 250 of the bag 200 in between the elongated hooks 450 and 460 of the clip 400. Once the neck 250 of the bag 200 is positioned within the clip 400, the first plate 410 and the second plate 420 are rotated about the hinge 430 until the elongated hooks 450 and 460 engage, thereby securing the neck 250 of the bag 200 therebetween. In this manner, the clip 400 will secure the layers of the ice pack together at the neck 250 and prevent the escape of ice and liquids within the containment section 240 of the bag 200. However, if the neck 250 of the bag 200 is not positioned completely within the clip 400, the user will be alerted to the improper interface by the difficulty of closing the clip 400, or the obscure angle of the clip 400 relative to the neck 250 of the bag 200.

Referring still to FIGS. 1–8 in combination, the containment portion 240 of the bag 200 containing the ice can be placed against the location which is desired to cool. The user can apply either the first side wall 210 of the bag 200 against the surface to be cooled, or the second side wall 220 of the bag 200 against the surface to be cooled, depending on the degree of heat transfer and temperature difference which is desired by the user. Liquids inserted into the bag 200 with the ice, or from the melting of the ice, will pass through the holes perforated in the insulation layers 214 and 224 of the walls 210 and 220. A pocket of liquid will form in between the insulation layer 214 and the waterproof layer 216 of the first wall 210, and in between the insulation layer 224 and the waterproof layer 226 of the second wall 220. These pockets of liquid facilitate the transfer of heat and reduce temperature gradients, or hot and cold "spots" across the surface of the first side wall 210 or the second side wall 220.

Still referring to FIGS. 1–8 in combination, the ice pack 100 is secured to an object by wrapping the pile straps 330 and 380 around the object and fastening the pile straps 330 and 380 to the first side hook strips 320 and 370, respectively. Because the pile straps 330 and 380 fasten to the hook strips 320 and 370 simply by applying a slight pressure, the user will be able to secure the ice pack 100 with only one free hand. In contrast, the prior art devices are secured by tying a knot in a pair of straps, which requires the use of both hands. Therefore, a user will need assistance from another person to secure the prior art device ice pack to an area of the body such as an arm. The improvement of securement devices 310 and 360 will allow a user to apply and adjust the ice pack 100 on an area, such as an arm, without assistance from another person.

Referring still to FIGS. 1–8 in combination, once the user is finished with using the ice pack 100, the ice pack 100 can be opened by pulling the mouth 240 of the bag 200 away from the containment section 240 of the bag 200. This will force the elongated hooks 450 and 460 of the clip 400 to separate, and allow the neck 250 of the bag 200 to open. After the bag 200 has been opened, the ice and liquids can

be removed from the ice pack **100** through the opening **262** in the mouth **260** of the bag **200**, and the ice pack **100** can be discarded or saved for later use.

Although the present invention has been described in considerable detail with reference to certain preferred embodiments thereof, other embodiments are possible. For example, the multilayered bag described herein can be used without a clip, or with any type of clip, or without the clip mounting tab. As another example, the clip mounting tab described herein can be used with any type of bag or with any type of clip. As yet another example, the clip described herein can be used with any type of bag, or without the clip mounting tab. As yet another example, the securement devices described herein can be used with any type of bag and without the clip. Therefore, the spirit and scope of the appended claims should not be limited to the description of the preferred embodiments contained herein.

What is claimed is:

1. An ice pack bag having a containment section, a neck, and a mouth, said ice pack bag further comprising:

a first side wall including:

a waterproof layer disposed in the area of the first side wall which forms said containment section, said neck, and said mouth; and

an insulation layer disposed over the waterproof layer and in the area of the first side which forms the containment section; and

a second side wall;

wherein said first side wall is welded to said second side wall to form said containment section, said neck being in communication with said containment section, and said mouth being in communication with said neck and having an opening; and

wherein said second side wall further includes:

a throat piece disposed in the area of said second side wall which forms the mouth, the neck, and an upper portion of the containment section;

an insulation layer disposed over the throat piece and in the area of said second side wall which forms the containment section; and

a waterproof layer disposed over the insulation layer and in the area of said second side wall which forms the containment section, the neck, and an upper portion of the neck.

2. The ice pack bag according to claim **1**, wherein the insulation layer of said second side wall is bonded to the waterproof layer of said second side wall.

3. The ice pack bag according to claim **1**, wherein the insulation layer of said second side wall is provided with a plurality of holes.

4. The ice pack bag according to claim **1**, wherein said second side wall includes a barrier layer disposed over the waterproof layer and in the area of said second side wall which forms the containment section of said bag.

5. The ice pack bag according to claim **1**, wherein said first side wall includes a barrier layer disposed over the insulation layer and in the area of said first side wall which forms the containment section of said bag.

6. The ice pack bag according to claim **1**, including a first handle formed in said first side wall adjacent to the opening in said mouth; and

a second handle formed in said second side wall adjacent to the opening in said mouth.

7. The ice pack bag according to claim **6**, wherein said first handle comprises a hole formed in the waterproof layer of said first side wall, and wherein said second handle comprises a hole formed in the waterproof layer of said second side wall.

8. An ice pack bag having a containment section, a neck, and a mouth, said ice pack bag further comprising:

a first side wall including:

a waterproof layer disposed in the area of the first side wall which forms said containment section, said neck, and said mouth; and

an insulation layer disposed over the waterproof layer and in the area of the first side which forms the containment section; and

a second side wall;

wherein said first side wall is welded to said second side wall to form said containment section, said neck being in communication with said containment section, and said mouth being in communication with said neck and having an opening;

wherein said second side wall further includes:

a throat piece disposed in the area of said second side wall which forms the mouth, the neck, and an upper portion of the containment section;

an insulation layer disposed over the throat piece and in the area of said second side wall which forms the containment section; and

a waterproof layer disposed over the insulation layer and in the area of said second side wall which forms the containment section, the neck, and an upper portion of the neck; and

wherein said second side wall has a different heat transfer rate than said first side wall.

* * * * *

United States Patent [19]

Natali

[11] Patent Number: 5,052,387

[45] Date f Patent: Oct. 1, 1991

[54] **COLD PACK FOR WRAPPING INJURED LIMBS AND METHOD OF MAKING**

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[21] Appl. No.: **532,210**

[22] Filed: **Jun. 1, 1990**

[51] **Int. Cl.**[5] **A61F 7/10**

[52] **U.S. Cl.** **128/402**; 383/63

[58] **Field of Search** 128/402, 403, 379, 380; 62/530; 383/901, 63, 65

[56] **References Cited**

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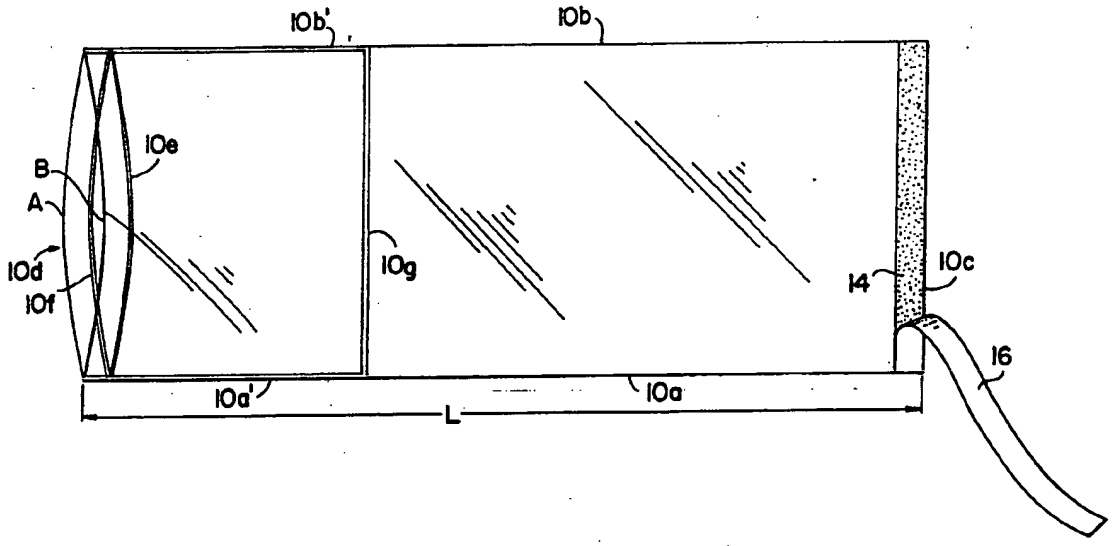
Primary Examiner—Edward M. Coven
Assistant Examiner—Mark S. Graham
Attorney, Agent, or Firm—McCormick, Paulding & Huber

[57] **ABSTRACT**

An ice pack is made from two thermoplastic sheets of polyethylene to provide a rectangular shape that has a small ice compartment defined at one of the rectangle's shorter sides. The opposite short side has a strip of adhesive covered with release paper. In use the ice filled bag end is closed, and the release paper removed so the pack can be conveniently wrapped and secured in place on the injured person.

10 Claims, 2 Drawing Sheets



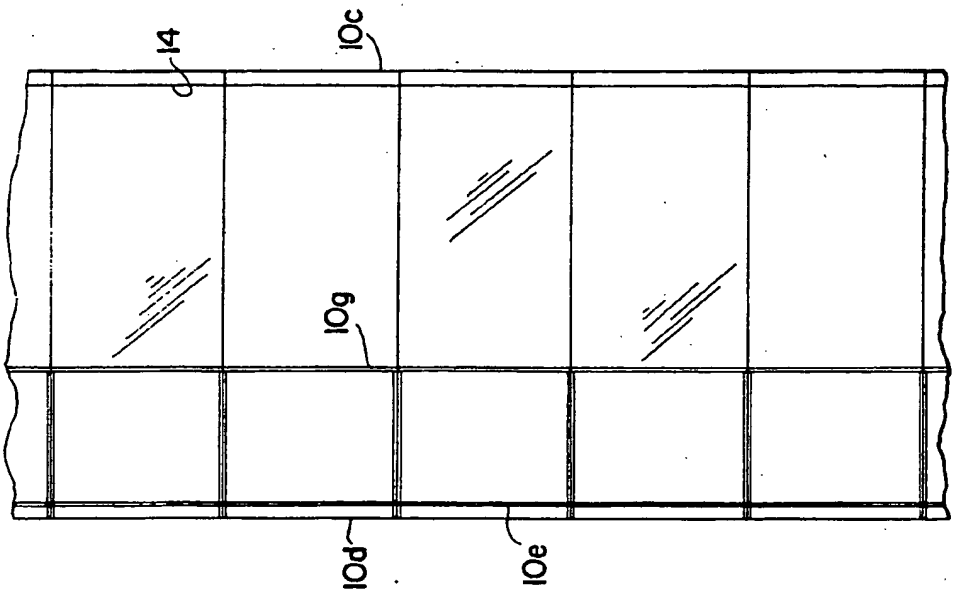


FIG. 3

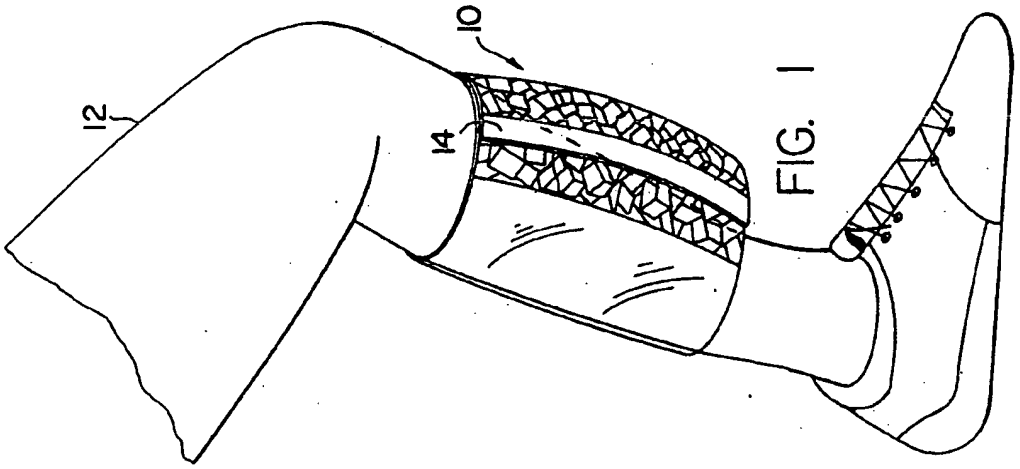


FIG. 1

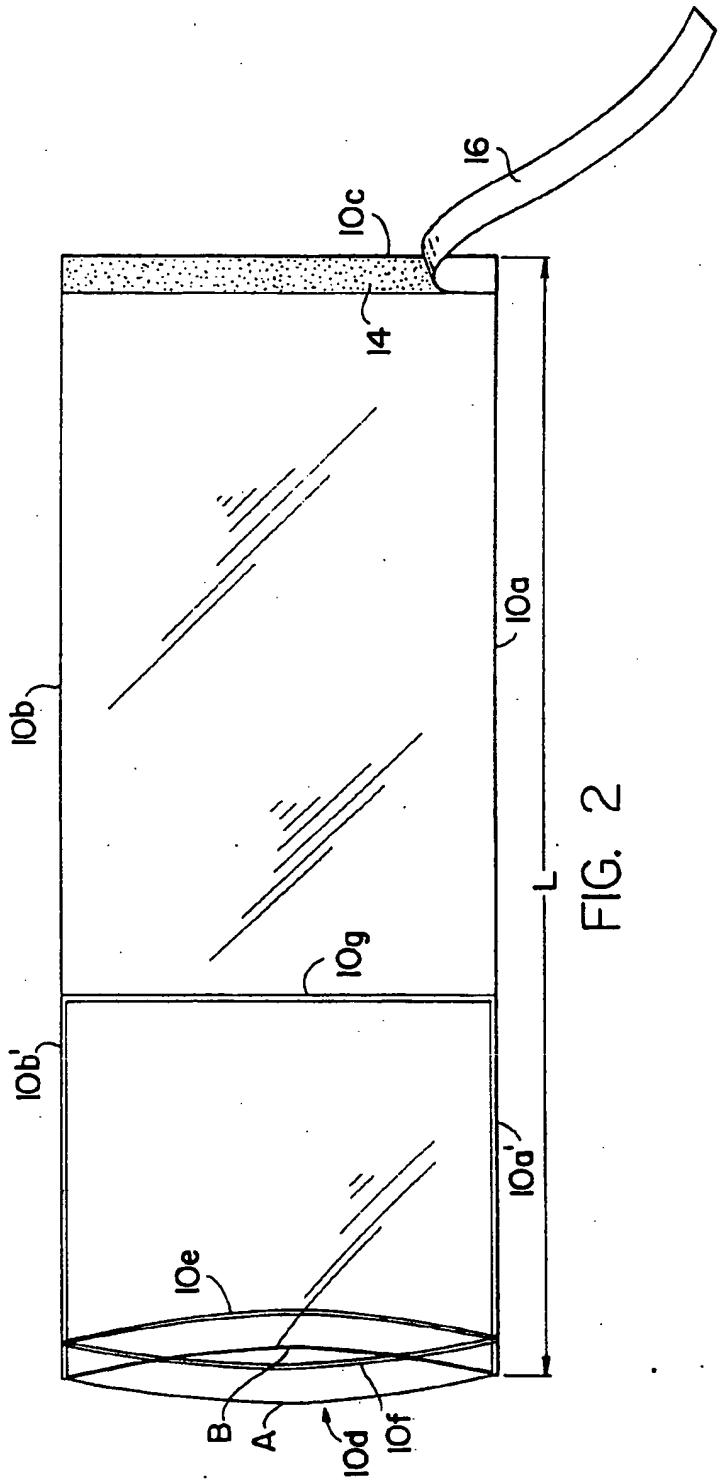


FIG. 2

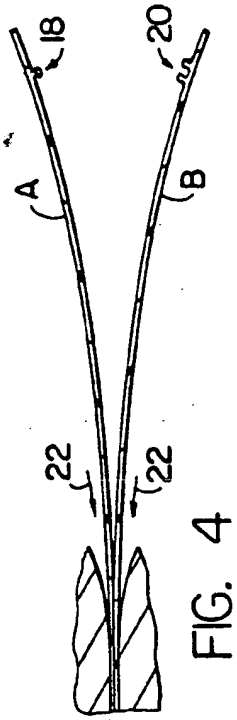


FIG. 4

COLD PACK FOR WRAPPING INJURED LIMBS AND METHOD OF MAKING

This invention relates generally to cold packs for wrapping an injured person's limb or other body part and deals more particularly with a relatively inexpensive pack mode from plastic film, which pack not only defines a bladder or reservoir for receiving ice cubes or the like but which also defines a strap portion for securing the bladder or ice pack to the person's limb.

In accordance with the present invention a cold pack is provided comprising a generally rectangular bag formed from thermoplastic film with front and rear panels welded along at least the two long sides of the rectangle and along one short side. The other short side has complimentary ribs integrally formed on the inside surfaces of these panels to permit said other short side to be open or closed. A weld line extends laterally across the front and rear panels connecting these two long sides to define an enclosed void between portions of the panels and to define an inner end of the ice pack compartment itself. This ice pack compartment preferably comprises at least approximately one third the total area of the pack so formed.

SUMMARY OF THE INVENTION

In accordance with the method of the present invention ice packs of the above described variety are fabricated in accordance with a method comprising the following steps:

providing two sheets of thermoplastic film, forming ribs in these sheets on :he surfaces that will mate with one another to form a closure adjacent a first marginal edge of the sheets, feeding these sheets in a direction parallel these ribs so that these ribs mate with one another as the sheet are brought into contact with one another, welding the sheets along a second marginal edge opposite the first marginal edge, applying a adhesive layer to one of said sheets adjacent the welded second marginal edge, applying a release paper to this adhesive layer, welding the sheets on a line parallel these first and second marginal edges and in spaced relation there between, welding and cutting these sheets at spaced locations longitudinally of the sheets to form rectangular bags.

DRAWING DESCRIPTION

FIG. 1 is a perspective view illustrating a cold pack construction in accordance with the present invention applied to the leg of an injured athlete.

FIG. 2 is a perspective view of the cold pack illustrated in FIG. 1 in position for receiving ice through an open end prior to applying the device to an injured body part as illustrated in FIG. 1.

FIG. 3 is a plan view of a film of plastic sheet in the process of being joined with another such sheet to provide a strip from which the cold packs of FIG. 2 are subsequently formed.

FIG. 4 shows the thermoplastic sheets illustrated in FIG. 3 in a side elevational view and illustrates the preliminary step forming the ribs on the inside or facing surfaces of the sheets to define the complementary ribs to permit releasably closing the ice receiving compartment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now to the drawings in greater detail, a cold pack is illustrated generally at **10** in FIG. **1** for wrapping an injured person's limb, and in the illustration shown this limb comprises a leg **12** and more particularly the lower portion of the leg **12**. The cold pack **10** could of course be wrapped around the upper portion of the leg shown or the knee or the ankle or any part of this limb or around any part of any other limb of a person depending upon the anatomical part injured or strained.

The ice pack **10** is shown in FIG. **2** as comprising a generally rectangular shape when laid flat and having two long sides 10_a and 10_b and a short side 10_c, each of which sides is defined by a weld. The rectangular ice pack is fabricated from two thermoplastic sheets according to a method which will be described hereafter. The fourth side, indicated generally at 10_d, is provided with integrally formed ribs 10_b and 10_f that are so configured as to cooperate with one another to permit the open side 10_d to be selectively closed.

The two panels A and B from which the cold pack **10** is fabricated are also welded along a line 10_g extending laterally across the front and rear panels between the two long sides 10_a and 10_b and this weld 10_g is preferably of a double welded configuration for added strength as are the two parallel segments $10_{a'}$ and $10_{b'}$ of the longer sides 10_a and 10_b in order to provide a secure compartment or void between the panel portions A and B. As so constructed and arranged ice can be placed in the void defined between the panels A and B and more particularly between the open end 10_d and the welded inner end 10_g of the compartment or void.

In further accordance with the present invention a strip of adhesive **14** is provided on one of the panels A or B adjacent the short side 10_c. This adhesive is covered with a release paper **16** that can be conveniently peeled off as suggested in FIG. **2** in order to expose the adhesive layer **14**. The ice pack is first filled with ice as described above and then wrapped around the injured person's body part as suggested in FIG. **1** and attached in a secure fashion by means of the adhesive layer **14**. This adhesive is preferably of the pressure sensitive type, and may be applied during fabrication of the bag to one panel A or B as described below.

The thermoplastic film used to fabricate a cold pack in accordance with the present invention preferably comprises a polyethylene sheet having a thickness in the range between two and four mils, and is preferably opaque, white being the preferred color for this material. Such a material can be conveniently imprinted with directions as to use of the bag or ice pack, and may of course be imprinted with the logo of the manufacturer.

In accordance with the present invention such a bag is preferably fabricated in accordance with a method best described with reference to FIGS. **3** and **4**. This method includes the following steps:

Providing two sheets of thermoplastic film as indicated generally at A and B having a width corresponding to the length L of the bag itself. The first step is best shown in FIG. **4** and includes suitable means, indicated generally at **18** and **20**, for forming at least one rib in one of these thermoplastic films and a complementary pair of ribs in the other such sheet in order to provide a releasable closure as suggested previously with reference to the ribs 10_e and 10_f in FIG. **2**. If desired two ribs may be formed in one sheet and three in the other to

provide a double closure so that melted water from the ice will not be a problem to the person fitted with the cold pack in the manner suggested in FIG. 1. The sheets A and B in FIGS. 3 and 4 are fed in the direction of the arrow 22 at a similar speed and are mated with one another as suggested in FIG. 4. These sheets are welded along marginal edges opposite the first marginal edge as indicated generally at 10_c, the ribs 10_e and 10_f being formed in the first marginal edge 10_d. An adhesive layer 14 is applied to one of these sheets adjacent the welded second marginal edge 10_c as shown in FIG. 3.

A release paper 16 (best shown in FIG. 2) is applied to this adhesive layer 14. The welded sheets are further welded along a double weld line 10_g parallel said first and second marginal edges 10_c and 10_d and in spaced relation therebetween. This spacing is preferably such that the area of the panel forming the void for the ice compartment is on the order of one half the area of the remaining ice pack. This geometry provides a sufficient length L for the bag of FIG. 2 so as to permit it to be wrapped around a person's limb as suggested in FIG. 1, and provides a convenient means for locating the ice pack itself in this wrapping process so as to assure that the cold pack is brought into contact with the injured portion of the person's anatomy.

Finally, the rectangular pack of FIG. 2 preferably has short sides that are less than one-half but greater than one-third the length L of the long sides. Again, this geometry assures an efficient size and shape for an ice pack constructed in accordance with the present invention.

I claim:

1. A cold pack for wrapping an injured person's limb or other body part and comprising:

A generally rectangular bag formed from thermoplastic film, said bag including front and rear panels joined along at least the two long sides, said panels being joined also along one short side, another short side opposite said one short side having complementary ribs integrally formed on inside surfaces of these panels to permit said another short side to be opened and closed, a weld line extending laterally across the front and rear panels between said two long sides to define an enclosed void between portions of said panels and to define an inner end of an ice compartment, an outer end of said ice compartment defined by said another short side, and at least one strip of adhesive on one of said panels adjacent said one short side.

2. The cold pack according to claim 1 further including a release paper strip provided over said adhesive strip.

3. The cold pack according to claim 1 wherein said adhesive is of the pressure sensitive type.

4. The cold pack according to claim 1 wherein said thermoplastic film has a thickness in the range of two to four mils.

5. The cold pack according to claim 1 wherein said lateral weld line defines an area for said ice compartment as defined by said panels that is at least approximately one-half the area of said panels between said weld line and said one short side.

6. The cold pack according to claim 1 wherein said rectangular bag has short sides that are less than one-half the length of said long sides.

7. The cold pack according to claim 2 wherein said adhesive is of pressure sensitive type.

8. The cold pack according to claim 7 wherein said thermoplastic film has a thickness in the range of two to four mils.

9. The cold pack according to claim 8 wherein said lateral weld line defines an area for said ice compartment that is at least approximately one-half the size of the area defined between the weld line and said one short side.

10. The cold pack according to claim 9 wherein said rectangular bag short sides are less than one-half the length of said long sides.

* * * * *

US006582383B2

(12) **United States Patent**
Horning

(10) **Patent No.: US 6,582,383 B2**
(45) **Date of Patent: Jun. 24, 2003**

(54) **BANDAGE FOR APPLICATION OF THERAPEUTIC COLD OR HEAT TREATMENTS TO INJURIES**

(76) Inventor: **Larry R. Horning**, 41 N. Briarcliff Rd., Mountain Lakes, NJ (US) 07046

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/371,314**

(22) Filed: **Aug. 10, 1999**

(65) **Prior Publication Data**

US 2002/0052569 A1 May 2, 2002

(51) **Int. Cl.**[7] **A61F 13/00**
(52) **U.S. Cl.** **602/60**; 602/75; 607/112; 607/114
(58) **Field of Search** 602/60, 75; 607/108, 607/109, 110, 111–114

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Primary Examiner—Nicholas D. Lucchesi
Assistant Examiner—Lalita M. Hamilton
(74) *Attorney, Agent, or Firm*—Ernest D. Buff & Associates; Ernest D. Buff

(57) **ABSTRACT**

A bandage wrapped around a body part has a flexible central web which is generally annular in shape. At least one pouch is affixed to the central web. The pouch contains a removable temperature transference source therewithin. The bandage is especially suited for the treatment of swelling, and for use during post-operative surgeries. It is also suited for treatment of traumatic insults to various body regions, including the chest, torso, legs, arms, wrists, shoulder, head and neck, knees, thighs, ankles, jaw, chin, lower back, knee thigh and shoulder and the like.

13 Claims, 5 Drawing Sheets

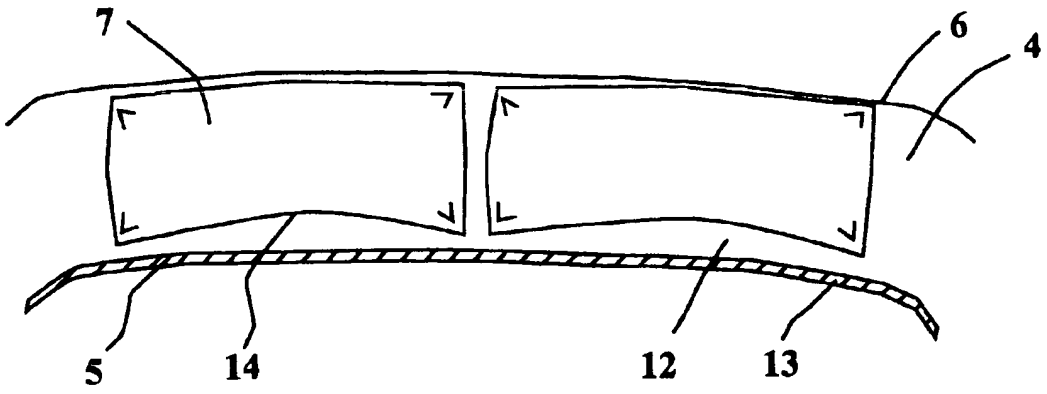


Fig. 1a

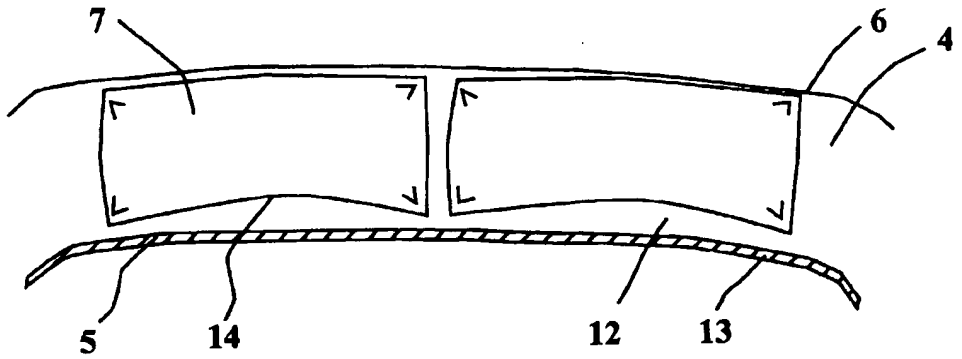


Fig. 1b

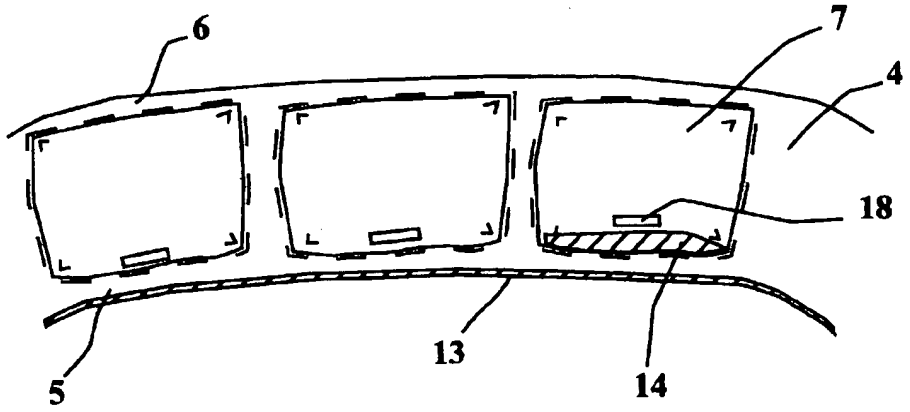


Fig. 1c

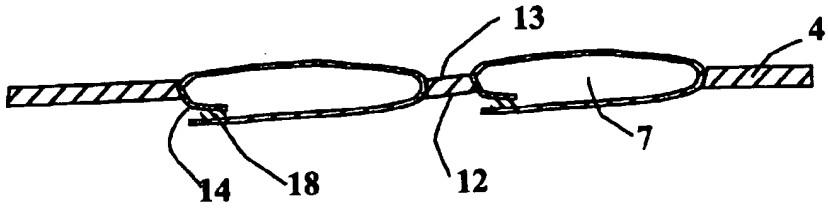


Fig. 2

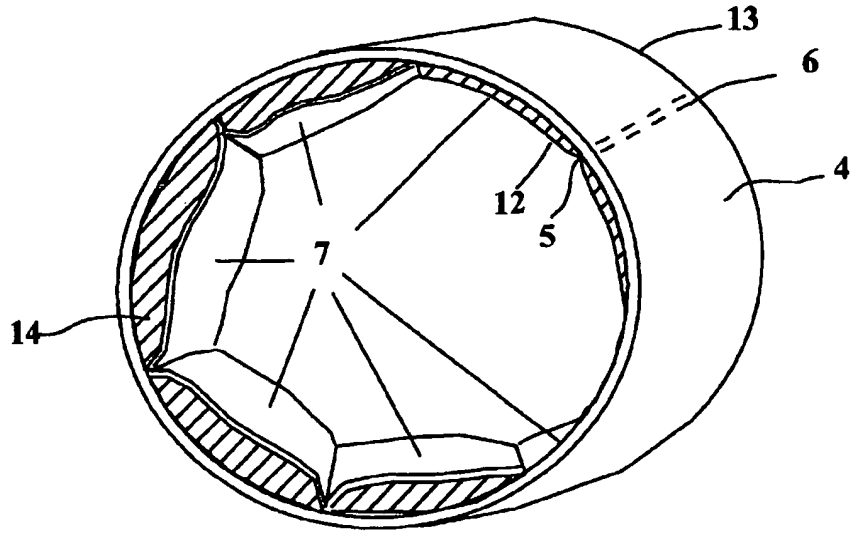


Fig. 3

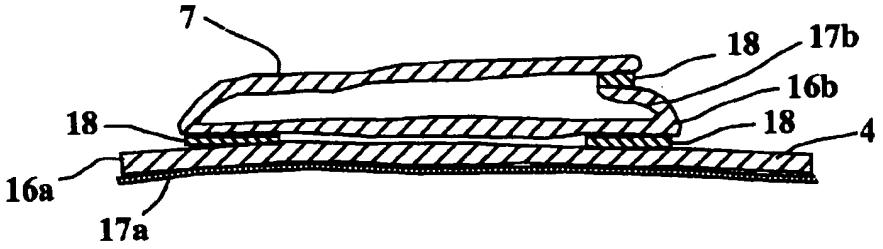


Fig. 4

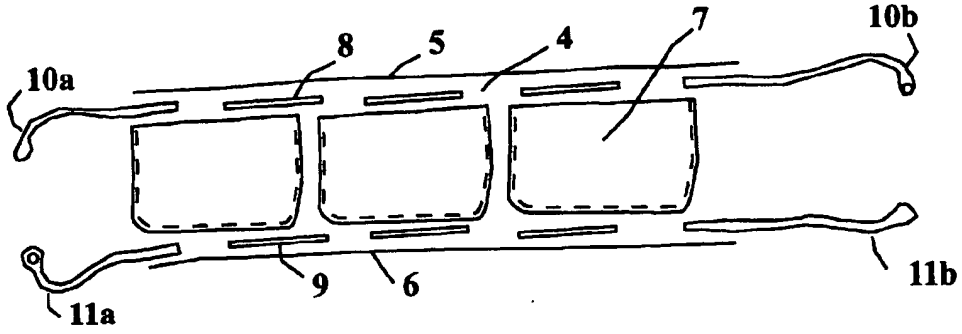


Fig. 5

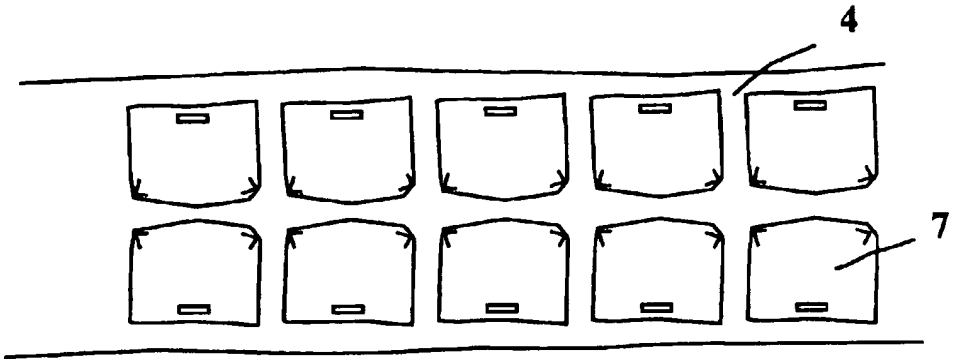


Fig. 6

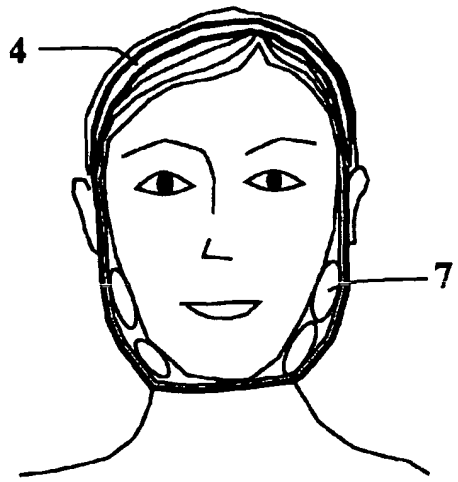


Fig. 7

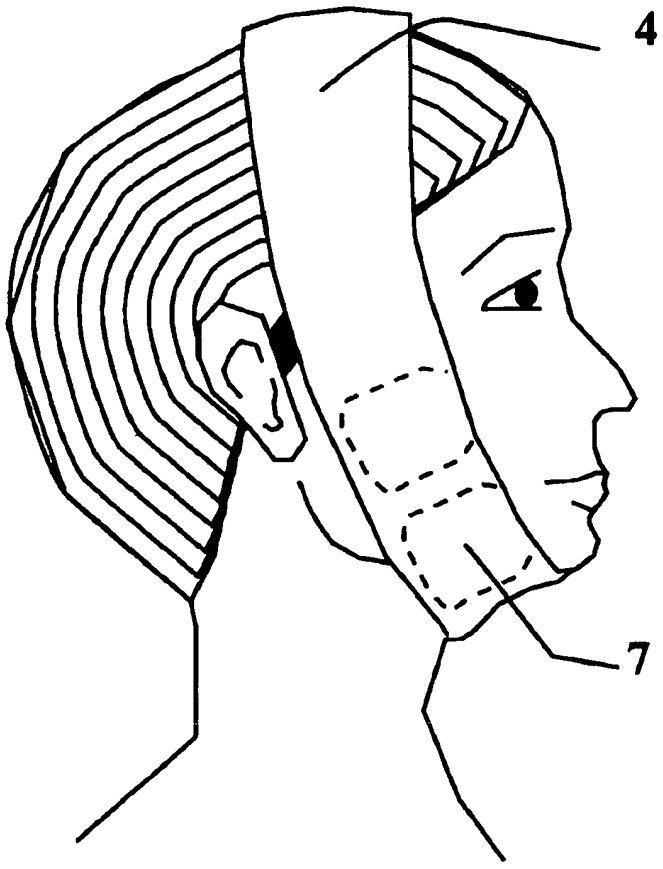
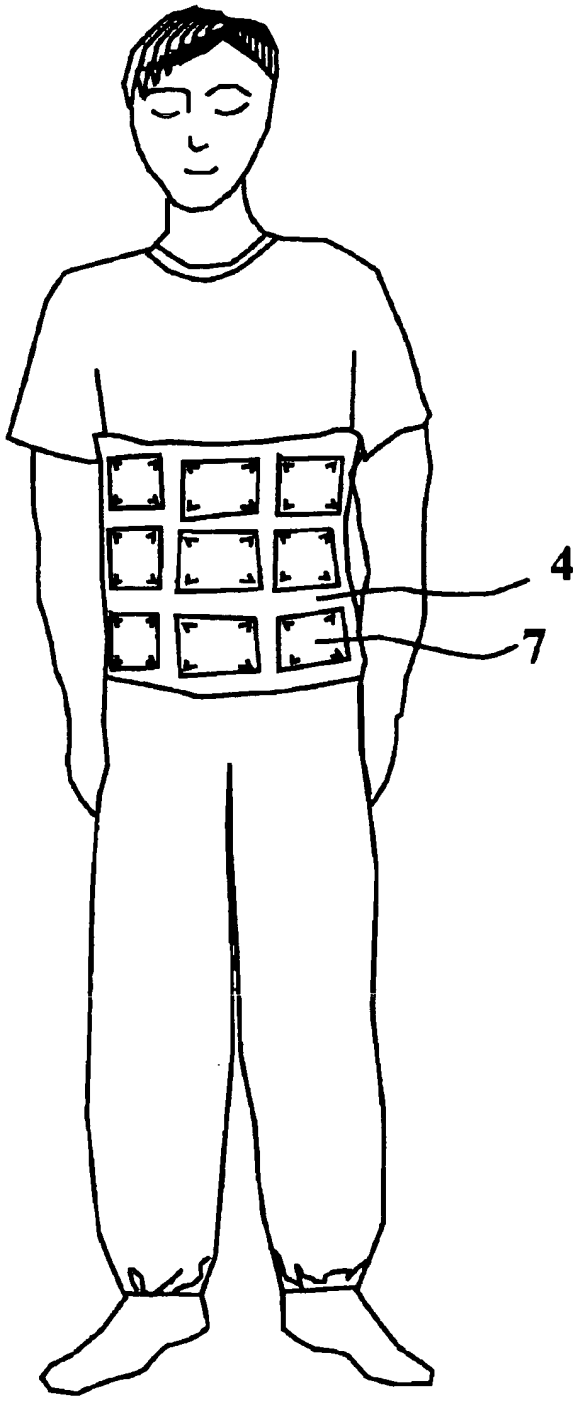


Fig. 8



BANDAGE FOR APPLICATION OF THERAPEUTIC COLD OR HEAT TREATMENTS TO INJURIES

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a bandage for the application of therapeutic treatments to injuries; and more specifically, to a bandage useful for applying heat or cold treatments to a specific portion of the body.

2. Description of the Prior Art

It is well known that the application of heat or cold therapies provides effective relief for muscle and joint injuries. When properly applied, heat and cold treatments provide effective relief from sprains, strains, bruises, muscle trauma, and other injuries to the body. Generally, a patient seeking to apply such treatments will place ice bags, cold compresses or pads comprised of folded cloth containing ice or heat packs on injured body areas. Typically, these devices are held in place by means such as adhesive tapes, tying gauze strips or surgical dressings or by merely having the patient lie on or sit next to such compresses so that cold or heat may reach injury areas. Inasmuch as these treatments provide relief to the patient, they cause the patient to suffer from cold hands, dripping containers, tape removal, repetitive applications, immobility or the like associated with the application of such therapies. Moreover, these bandages tend to not remain in place during vigorous activity.

Numerous cylindrical type wrap configurations have been proposed in the prior art for applying heat and cold treatments to an injured body part. In some instances, these devices are open ended and may be adjusted for use by virtue of fastening means on one end thereof. For example, U.S. Pat. No. 5,065,738, describes a cold pack for treating an injury in which a cooling media, such as Blue Ice, is encased in elongate plastic closed end cylinders and inserted in parallel pockets formed in a wrapper, e.g., made of cloth with the interconnecting cloth material forming flexible hinges between the cylinders. Straps provided on the wrap enable the application of the pre-chilled cold pack to be applied to the injured area of a person. U.S. patent application Ser. No. 5,304,216 describes an ice pack apparatus with a flexible base web and having a polymeric foam web connected to a bottom surface of the base web with at least one refrigerant housing mounted to a top surface of the base web positioned over the foam web. The base web structure is formed of various lengths and has a fastener structure arranged at opposed ends of the base web to secure the structure around various appendage portions of the body. U.S. Pat. No. 3,900,035 discloses an elastic bandage having spaced, transverse pockets permanently affixed to one end of the bandage which are configured to allow elastic flexible bags to be inserted therein. The bags are constructed of latex or a similar material and filled with anti-freeze coolant solution or a heat retaining agent. In practice, the pocketed end of the bandage is wrapped about a limb and the remainder of the bandage is wrapped around the pockets to provide support and insulation. The bandage is useful, for example, to treat ankle or joint injuries in humans and animals.

In other instances, the cylindrical-shaped device may be of a continuous configuration. U.S. patent application Ser. No. 5,466,251 describes a therapeutic elastic sleeve which is formed from a wide sheet of elastic material that is permanently attached to the sides of an ice pack or other appropriate heat or coolant container. The elastic portion of the sleeve can be stretched to allow the sleeve to slip over the patient's limb and align the container with the area to be treated. The elasticity of the sleeve causes it to conform to the shape of the limb, which provides structural support to the limb and also prevents the sleeve from riding up or down, or telescoping on the limb.

In yet other instances, the device is specifically designed to treat a particular body part. For example, in U.S. Pat. No. 4,190,054 there is described an elastic bandage designed to support the face after cosmetic surgery. Openings are provided at strategic locations, such as the top of the head and adjacent to the back of the neck, in order to permit the bandage to be secured around the face of a user. These openings are provided with suitable fastening means such as VELCRO® strips, to close the bandage around the face. The bandage incorporates a number of attachment points over the surface thereof for attachment of specifically designed attachable envelopes containing a heatable or coolable fluid therein which are secured to the bandage via complementary VELCRO® strips on the outside of the bandage and on one side of the envelope. The bandage permits application of heat or cold treatment without removing the bandage from the face part.

None of these prior art configurations provides therapeutic effectiveness together with ease of use and mobility. What is needed is a device which can be used to supply heat and cold therapies and which affords complete mobility to its users. Such a device should be readily adapted for use in the treatment of traumatic injuries to various body regions and should not require removal after positioning.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided a bandage capable of being wrapped around a body part comprising a flexible central web being generally annular in shape; and at least one pouch affixed to the central web, wherein the pouch contains a removable temperature transference source, such as refrigerant or heat, therein. Preferably, the pouch is removably affixed to the central web. The bandage may be readily adapted for the treatment of swelling, for use during postoperative surgeries or traumatic insults to various body regions, including but not limited to chest, torso, legs, arms, wrists, shoulder, head and neck, knees, thighs, ankles, jaw, chin, lower back, knee thigh and shoulder and the like.

Generally stated, the bandage has upper and lower horizontal edges and has a continuous, generally annular configuration. The bandage may be made of flexible cloth or plastic material, preferably an elastic cloth material. Pouches for the storage of cold or heat packs also made of pieces of flexible cloth or plastic material, may be fixedly or removably attached to the outside surface of the wrap structure device by fastener attachments such as VELCRO®, clips, hooks, and the like. In a preferred embodiment of the bandage, the attachment of the pouches to the wrap structure is such that the flexible cloth material is brought into direct contact with the area of the body appointed to be cooled (or heated) thereby. The pouches may be attached to the bandage either in single or multiple rows aligned parallel to the horizontal edges of the device. Optionally, the pouches may be insulated with waterproof materials, e.g., plastic, mesh, etc. to prevent leakage and may also comprise closing means such as flaps, zippers, snaps and the like to prevent cold or heat packs from falling out.

In operation, the patient inserts pre-frozen ice or heat packs into the pouches, and the bandage is secured around

the injured body area. The bandage may be adjusted for individual size and comfort to achieve the most effective use without slackness or tightness. Preferably, arrangement of the pouches on the bandage is such that the cloth or other material providing for maximum temperature transference is placed in direct contact with the body part appointed to be cooled (or heated) thereby. The bandage may be produced in a variety of adult and child sizes, lengths and widths for adaptation to particular body types, injuries and for greater user comfort.

Advantageously, the bandage of the present invention offers the patient mobility for other matters by eliminating the manually burdensome need to hold cold or heat packs to injuries as well as the need for frequent changes of such packs. That is, patients may make facile pack changes with or without having to take off or substantially remove the bandage once it is wrapped around the injury area. Moreover, the bandage of the present invention is configured so that it stays in position during and after vigorous activity. As such, the present invention may be readily adapted for use in the treatment of a myriad of traumatic insults to various body regions, after post-operative surgeries and even to provide comfort in common colds and fevers.

In another aspect of the present invention there is provided a method for the application of the bandage to provide therapeutic cold or heat treatments which enables users to attend to injuries without repetitive ice or heat pack changes. This method advantageously eliminates frequent manual administration of such packs to injury areas and resulting inconveniences, such as dripping bags or containers and bandage removals.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more fully understood and further advantages will become apparent when reference is made to the following detailed description of the preferred embodiments of the invention and the accompanying drawings in which:

FIG. 1(*a*) shows a top view of the bandage of the present invention fully extended with a single row of removable pouches horizontally positioned along the length of the bandage;

FIG. 1(*b*) shows a top view of an alternative embodiment of the bandage of the present invention, the pouches being arranged so that the cloth material providing maximum temperature transference is positioned towards, and in direct contact with the body part appointed to be cooled (or heated) thereby;

FIG. 1(*c*) is a side view of the embodiment of the bandage shown in FIG. 1(*b*);

FIG. **2** shows the continuous generally annular shape of the bandage of the present invention;

FIG. **3** is a cross-section showing layers of the central web and the pouch;

FIG. **4** is a top view of the bandage of the present invention fully extended with a cinch band at each horizontal edge;

FIG. **5** is a top view showing a multiple row pouch configuration;

FIG. **6** is a front view of the bandage of the present invention secured around the head of a patient;

FIG. **7** is a side view of the bandage having a single row pouch configuration secured around the head of a user; and

FIG. **8** is a front view of the bandage having a multiple row pouch configuration and wrapped around the torso of a patient.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to a bandage for the application of therapeutic heat or cold treatments to injuries, and in particular, bandages having removable pouches which contain temperature transference devices therein. More specifically, the present invention comprises a bandage capable of being wrapped around a body part comprising a flexible continuous central web being generally annular in shape; and at least one pouch affixed to the central web, wherein each pouch has a removable temperature transference source therewithin. Preferably, each of the pouches is removably affixed to the central web, and the central web is arranged in relation to the pouches so that maximum transference of temperature is provided between the pouch contents and the body part appointed for treatment. Advantageously, the removable pouches permit heat or refrigerant sources to be inserted, removed, or changed without taking off the device. This affords greater patient mobility without repetitive changes of heat or refrigerant, thereby eliminating the need for frequent manual administration of heat and cold sources to injury areas with the resulting inconveniences, such as dripping containers and bandage removals. The configuration of the bandage allows the bandage to remain securely in position, even after vigorous activity. The present invention may be readily adapted for the treatment of traumatic insults to various body regions, after post-operative surgeries and even to provide comfort for common colds and fevers.

The invention can be more fully understood from the following description taken in connection with the appended drawings. Turning now to FIG. 1(*a*) of the drawings, there is shown a top view of the bandage broken away in the middle to illustrate a fully extended device. Broadly stated, the bandage comprises a continuous central web **4** with top **5** and bottom **6** generally horizontal edges, interior **12** and exterior **13** surfaces, and a plurality of pouches **7** affixed to central web **4**. Each of pouches **7** is removably affixed to the central web **4**; but it is within the purview of the invention for the pouches to be permanently attached to central web **4**.

In accordance with the present invention, central web **4** has a generally annular configuration. By generally annular is meant any configuration which forms a ring or a closed-loop-type configuration to form a continuous structure as illustrated in FIG. **2**. Typically, the continuous configuration is formed by joining together opposing ends of a rectangular shaped central web by means which are well known in the art such as by conventional sewing, bonding, welding and the like. For example, seams may be formed by connecting opposing edges with a thermoplastic adhesive tape, or the like.

Any material which is sufficiently flexible such that it remains intact, i.e., does not exhibit any apparent fissures or cracks, when it is wrapped around a body part may be used to construct central web **4**. Typically, central web **4** is constructed of a unidimensional stretch elastic cloth such as that commonly known as an ACE® bandage, a multidimensional stretch fabric such sold under the name SPANDEX™, LYCRA®, a rubber-based material such as NEOPRENE™, or a polymeric foam material. Optionally, central web may comprise either a waterproof or insulated material, or a material which is both waterproof and insulated. As illustrated in FIG. **3**, central web **4** may also comprise more than one layer of material, for example, an interior insulated layer **16***a* surrounded by a waterproof layer **17***a*. Alternatively, central web **4** may comprise a plurality of insulating layers

surrounded by a waterproof layer. Preferably, central web **4** contains a plurality of openings into which the pouches **7** are inserted. The side of the opening adjacent the body part being treated is composed of material having high temperature transfer capability. As shown by FIG. **1**(*b*) this is readily accomplished by arranging the pouches **7** on central web **4** so that the pouches are brought into direct contact with the body part appointed for treatment.

As shown by FIG. **2**, central web **4** may comprise one or more single layers of material. Optionally, each layer may be folded back on itself and seamed at either horizontal edge **5** or **6** to form a double layer of material. In this instance, the seams may be formed by conventional sewing, bonding, welding, VELCRO® strip and the like, as discussed above.

Central web **4** may be of any size suitable for placement around at least one body part. The bandage may be fashioned such that the circumference and width of central web **4** may be readily adapted for the area to be treated. For example, a bandage suitable for use to treat the torso of a patient would be significantly larger and wider than a bandage suitable for use to treat a wrist or ankle, and the particularities of such size requirements are known and readily available to a skilled artisan. Optionally, central web **4** may have a specific geometric configuration or shape to account for the varying widths of different body parts. Thus, a wrap structure specifically designed for a knee might have a trapezoidal shape to account for the decreasing size of the leg from above to below the knee joint or a wrap designed for a hand could have a hand-type configuration to permit a patient to place his or her fingers within the wrap. Preferably, central web **4** is comprised of an elastic material which is stretched to place around the area being treated and once positioned, is allowed to contract into a snug position. In this instance, central web **4** might have a generally annular shape before placement over a portion of the body, and once positioned, could conform to the shape of the area under treatment. Thus, central web **4** can be constructed to impart a radial compressive force over the encircled portion of a body part. This is particularly suitable where it is desired to use pressure together with a temperature transference device in order to treat an injury. This also confers the benefit of allowing the bandage to remain securely in position, even after vigorous activity. In another embodiment illustrated in FIG. **4**, central web **4** may have cinch bands **8** and **9** which typically, are flexible elastic straps, located adjacent to horizontal edges **5** and **6**, respectively. In this configuration, central web **4** could be placed around a body part, and secured by pulling and fastening cinch band **8** by cinch band fasteners **10***a* and **10***b* and cinch band **9** by cinch band fasteners **11***a* and **11***b*. Cinch band fasteners **10***a* and **10***b* and **11***a* and **11***b* may comprise hook and loop fasteners such as VELCRO® strips, or any other type of hook, clips, buckles, lace, snap, strap or the like which will be readily evident to those skilled in the art. When cinch bands **8** and **9** are pulled into a taught position, central web **4** will generally conform to the shape of the area being treated and will remain securely positioned during repeated movement of that area. Advantageously, the choice of material (i.e. stretch or non-stretch material) used for central web **4** and cinch bands **8** and **9** can be vary varied to account for the degree of pressure which is desired for a particular injury.

The invention described herein further comprises at least one pouch **7** removably affixed to exterior surface **13** of central web **4**. Pouch configurations which are contemplated include, but are not limited to, open-ended or closed jackets, pockets, closed bags and the like. Basically, any type of configuration capable of holding an object therein may be used. As previously noted, pouch **7** is removably affixed to central web **4**. Pouch **7** may be affixed to central web **4** by any means suitable for attaching or fastening objects together, as for example, by hoop and loop fasteners known as VELCRO® strips, hooks, clips, buckles, laces, snaps, straps and the like. FIG. **3** illustrates a preferable embodiment wherein VELCRO® strips **18** are positioned on central web **4** and pouch **7** in opposing locations to facilitate easy fastening and removal of pouch **7**. This removable feature permits a patient to remove the pouch from the device, change the temperature transference device in the pouch, and replace the pouch on the bandage without removing the bandage from the patient. In this way, the patient does not suffer from the pain associated with bandage removal, nor with dripping and wet temperature transference devices. This feature is particularly beneficial for injuries requiring alternating heat and cold treatment.

Pouch **7** may be constructed of at least one layer of material which may optionally be insulated, waterproof or a combination thereof. For example, as illustrated in FIG. **3**, pouch **7** may comprise insulated layer **16***b* surrounded by waterproof layer **17***b*. Pouch **7** may be constructed of a flexible material such as the type listed above with reference to central web **4**. Alternatively, pouch **7** may be constructed of a rigid material such as plastic. Optionally, pouch **7** may be an elastic material which can be expanded by stretching. Once a heat or refrigerant source is positioned therein, the material is allowed to contract, and in so doing, exerts a compressive force which holds the temperature transference source inside of pouch **7**. Most preferably, the material of which pouch **7** is comprised is adapted to provide for maximum temperature transfer; and that material which is immediately adjacent the heating or cooling substance contained by the pouch is placed in direct contact with the body part appointed for treatment.

As previously indicated, pouch **7** may comprise a single pouch component. Typically, pouch **7** comprises a plurality of pouches which are individually positioned on or within a plurality of apertures of central web **4**, or which are presewn together forming a single structure which is positioned on central web **4** in a single row alignment as depicted in FIG. **1**. In the latter embodiment, temperature transfer is maximized when applying central web **4** of the bandage, if pouches **7** are placed in direct contact with the body part being treated. Alternatively, pouch **7** may be positioned on central web **4** in a multiple row alignment of two or more rows or columns as illustrated in FIG. **5**. Multiple row pouch alignments are useful, for example, to treat large injury areas such as the torso. This type of arrangement allows the use of a multitude of conventionally sized temperature transference devices to a large injury area which eliminates the need for large, cumbersome heat or refrigerant sources. In this arrangement, maximum temperature transfer is realized if pouches **7** are placed in direct contact with the body part being treated.

Referring again to FIG. **1**(*a*), pouch **7** has an opening **14** adapted to hold a temperature transference source therein. Pouch openings may face toward, away from each other or in any such combination in their attachment to exterior surface **13** of central web **4** as would be required for the particular use of the bandage. Pouch opening **14** has a means for closing the pouch disposed thereon. Closures suitable for use in this instance include flaps, zippers, snaps, and the like and would be readily apparent to the skilled artisan. These closures prevent the temperature transference sources placed inside the pouches from falling out. FIG. **3** illustrates the use of VELCRO® as a fastener to secure the temperature

transference device within pouch 7. Optionally, pouch 7 may have an additional layer of insulation to maintain the temperature required by the specific application for longer periods of time, thereby eliminating the need for frequent manual administration of the packs to the injury areas, and reducing other inconveniences associated with the bandages of the prior art, such as moisture from dripping bags or containers and frequent removal and change of the temperature transference source.

Suitable temperature transference sources for use in the present invention will be readily apparent to a skilled artisan and include ice, prepackaged cold packs such as commonly known as BLUE ICE™, hot packs, prepackaged heat or cold gels and the like. The temperature transference sources may have a rigid or flexible construction; basically, they need only be configured to fit in pouch 7 of the bandage. Preferably, the temperature transference source is a prepackaged gel which remains flexible upon heating and cooling.

In use, the bandage of the present invention is placed around the injured area which requires treatment. This can be accomplished by any conventional means such as stretching, slipping or pulling the bandage around the injured area. The bandage is then positioned by securing the cinch bands, or VELCRO® strip, or allowing the material to conform to the shape of the body part being treated, or a combination thereof. Temperature transference sources such as hot or cold packs are then inserted into the pouches. When the temperature transference source loses its efficacy, the pouch(s) can be removed from the bandage and the temperature transference source(s) changed and replaced back on the bandage, all with minimal disruption to the patient.

As illustrated in FIG. 6, the present invention may be adapted for dental procedures, such as wisdom teeth removal. For such applications, the bandage is preferably made of flexible cloth or plastic material, and more preferably, of a rectangular piece of elastic cloth material, and contains pouches constructed of flexible cloth or plastic material and has a plurality of pouches 7 made of flexible cloth or plastic material affixed in a single horizontal row affixed to the interior surface 23 of central web 4. In this instance, the pouches are adapted to hold ice packs, such as flexible preformed gel packs along the lower cheekbone and jawline. Maximum temperature transfer is facilitated when pouches 7 are brought into direct contact with the portion of the cheek proximate the jaw from which the wisdom teeth were removed.

FIG. 7 illustrates a side view of bandage as adapted for dental procedures. The bandage may be stretched around the patient's head in a lengthwise fashion and the ice packs secured in the removable pouches. In the embodiment shown, the ice removable pouches have openings in the forward portions thereof for insertion and removal of the ice pacts. As the ice packs begins to lose their efficacy, they may be removed and exchanged for fresh ice packs without removing the wrap device from the head of the patient. In this way, a patient can receive continuous cooling to the injured area without further discomfort or exacerbation of the injury.

The bandage illustrated in FIG. 7 can be arranged to wrap horizontally for treatment of forehead, scalp or neck injuries, soreness, or the like. Such a bandage may also be adapted to provide for continuous cooling or heating to injuries associated with limbs, appendages, and the like.

Referring now to FIG. 8, there is shown the bandage adapted for use on the torso of the body including, but not limited to lower back, chest, etc. injuries or applications. The bandage has the same general configuration as with the embodiment adapted for dental procedures except that multiple rows of a plurality of pouches 7 are pre-stitched together and the pouches are positioned along the entire circumference of the wrap structure. The bandage is comprised of a stretchable fabric which may also be waterproof. When the patient slips the device over his or her head and positions it in place, the bandage will securely hold the temperature transference sources therein and will also provide overall radial compressive forces around the torso. This is particularly suitable for treating injuries in which pressure to the injured area may aid in the healing process.

Having thus described the invention in rather full detail, it will be recognized that such detail need not be strictly adhered to but that various changes and modifications may suggest themselves to one skilled in the art, all falling within the scope of the invention, as defined by the subjoined claims.

What is claimed is:

1. A bandage capable of being wrapped around a body part, comprising:
   a. a flexible central web composed of an elastic material having a continuous, generally annular configuration;
   b. at least one pouch affixed to the central web, the pouch containing a removable temperature transference source therewithin;
   c. at least a portion of such pouch being composed of material having a temperature transfer capability greater than that of said elastic material;
   d. said pouch material having the greater temperature transfer capability being positioned toward and in direct contact with said body part; and
   e. said flexible central web elastic material being insulative and having temperature transfer capability less than the said pouch material.

2. A bandage as recited in claim 1, further comprising a plurality of pouches arranged in a horizontal row on the central web, at least a portion of each of said pouches being composed of material having temperature transfer capability greater than that of said elastic material, and said portion of each of said pouches being positioned toward and in direct contact with said body part.

3. A bandage as recited in claim 1, further comprising a plurality of pouches arranged in a plurality of horizontal rows on the central web, at least a portion of each of said pouches being composed of material having temperature transfer capability greater than that of said elastic material, and said portion of each of said pouches being positioned toward and in direct contact with said body part.

4. A bandage as recited in claim 1, wherein the temperature transference device is a preformed gel pack.

5. A bandage as recited by claim 1, wherein said pouch is removably affixed to said central web.

6. A bandage as recited by claim 1, wherein said central web has a plurality of pouches affixed thereto, said web having a plurality of apertures therein, and said pouches being inserted within said apertures.

7. The use of a bandage as recited by claim 1 for treating dental trauma.

8. The use of a bandage as recited by claim 1, for treating injury or soreness associated with the neck or head.

9. The use of a bandage as recited by claim 1, for treating injury or soreness associated with the arm or leg.

10. A method of treating an injury of a body part, comprising the steps of:
   a. applying thereto a bandage comprising a flexible central web composed of an elastic, insulative material having a continuous, generally annular configuration;

b. affixing to the central web at least one pouch containing a removable temperature transference device therewithin, at least a portion of said pouch being composed of material having a temperature transfer capability greater than that of said elastic material; and

c. orienting said pouch during said affixing step (b) so that said portion of said pouch is positioned toward and in direct contact with said body part.

11. A method of treating an injury, as recited by claim **10**, wherein said affixing step further comprises removably affixing said pouch to said central web.

12. A method of treating an injury, as recited by claim **11**, wherein said affixing step further comprises removably affixing a plurality of pouches to said elastic insulative material of said central web, at least a portion of each of said pouches being composed of material having temperature transfer capability greater than that of said elastic material, and said portion of each of said pouches being positioned toward and in direct contact with said body part.

13. A method of treating an injury, as recited by claim **12**, wherein said bandage is applied so that the orientation of said central web brings said pouches into contact with said injury.

* * * * *

US006083254A

United States Patent [19]

Evans

[11] Patent Number: 6,083,254

[45] Date of Patent: Jul. 4, 2000

[54] **REUSABLE HOT/COLD THERAPEUTIC COMPRESS APPLIANCE**

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[21] Appl. No.: **08/823,067**

[22] Filed: **Mar. 21, 1997**

Related U.S. Application Data

[60] Provisional application No. 60/013,935, Mar. 22, 1996.

[51] **Int. Cl.**[7] **A61F 7/00**

[52] **U.S. Cl.** **607/96**; 607/108; 607/112; 607/114

[58] **Field of Search** 126/204; 165/46; 607/104, 108–112, 114

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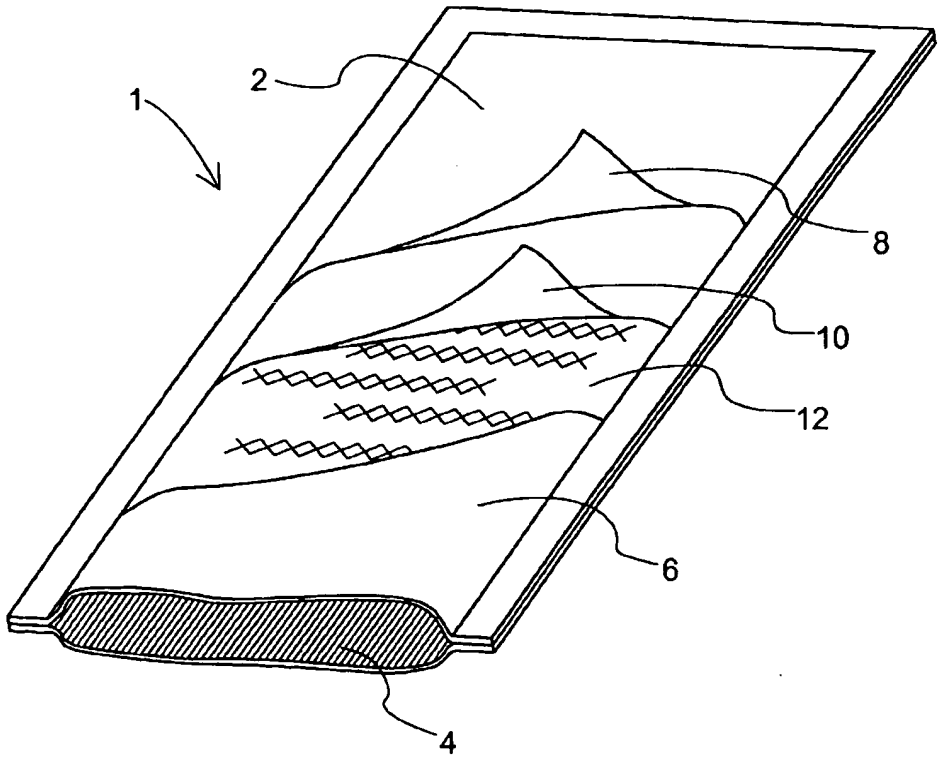
Primary Examiner—Cary O'Connor
Assistant Examiner—Ryan Carter
Attorney, Agent, or Firm—Robert H. Barrigar

[57] **ABSTRACT**

A family of reusable hot/cold therapeutic compress appliances for application to a large number of different treated areas on the body of a patient, each member of the family being dimensioned to receive an integral number of standardly sized and dimensioned pouches containing a heat absorbing material. Individual compress appliances of the family comprise at least one sealed pouch containing a heat absorbing material contained within a sleeve comprising a relatively heat-conductive patient-contact surface, an adjacent outer adherent surface, and an insulant disposed between the sealed pouch and the outer adherent layer to reduce heat transfer occurring away from the patient-contact surface. Attachment means associated with the sleeve are co-operatively configured so as to releasably adhere to any location on the outer adherent surface, allowing the patient using the compress appliance to select a location of adherence that may provide a safe and therapeutic compressive loading.

21 Claims, 10 Drawing Sheets



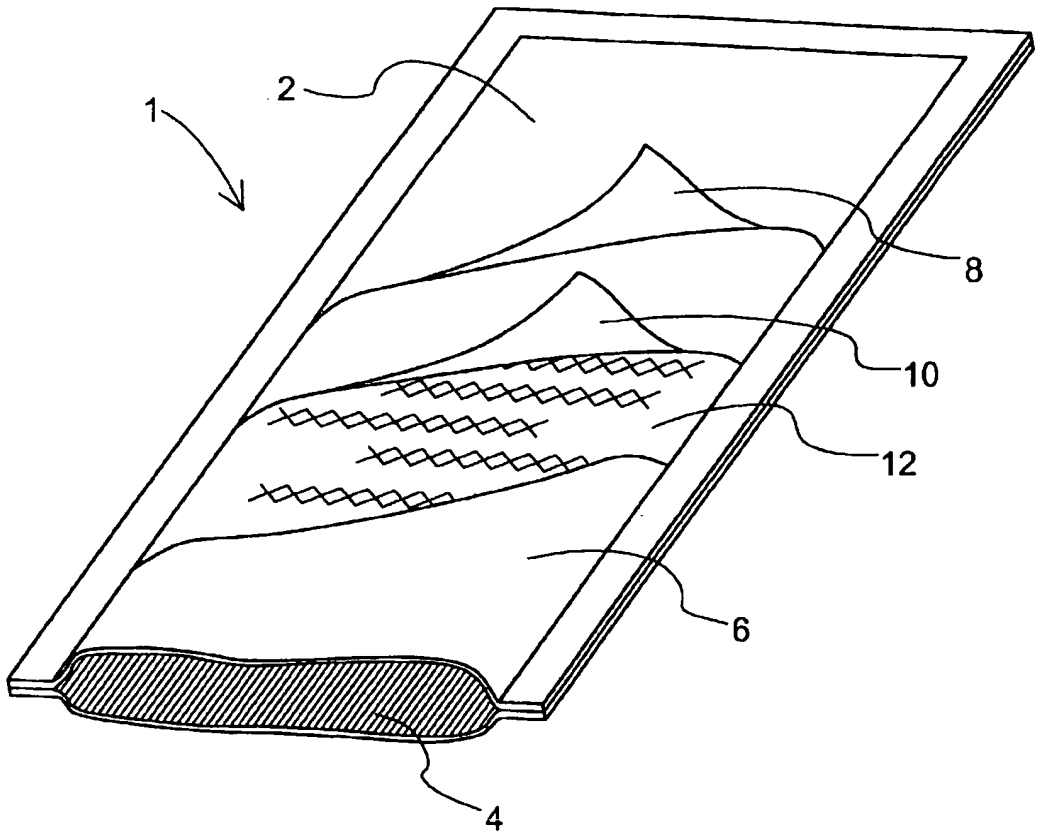


FIGURE 1

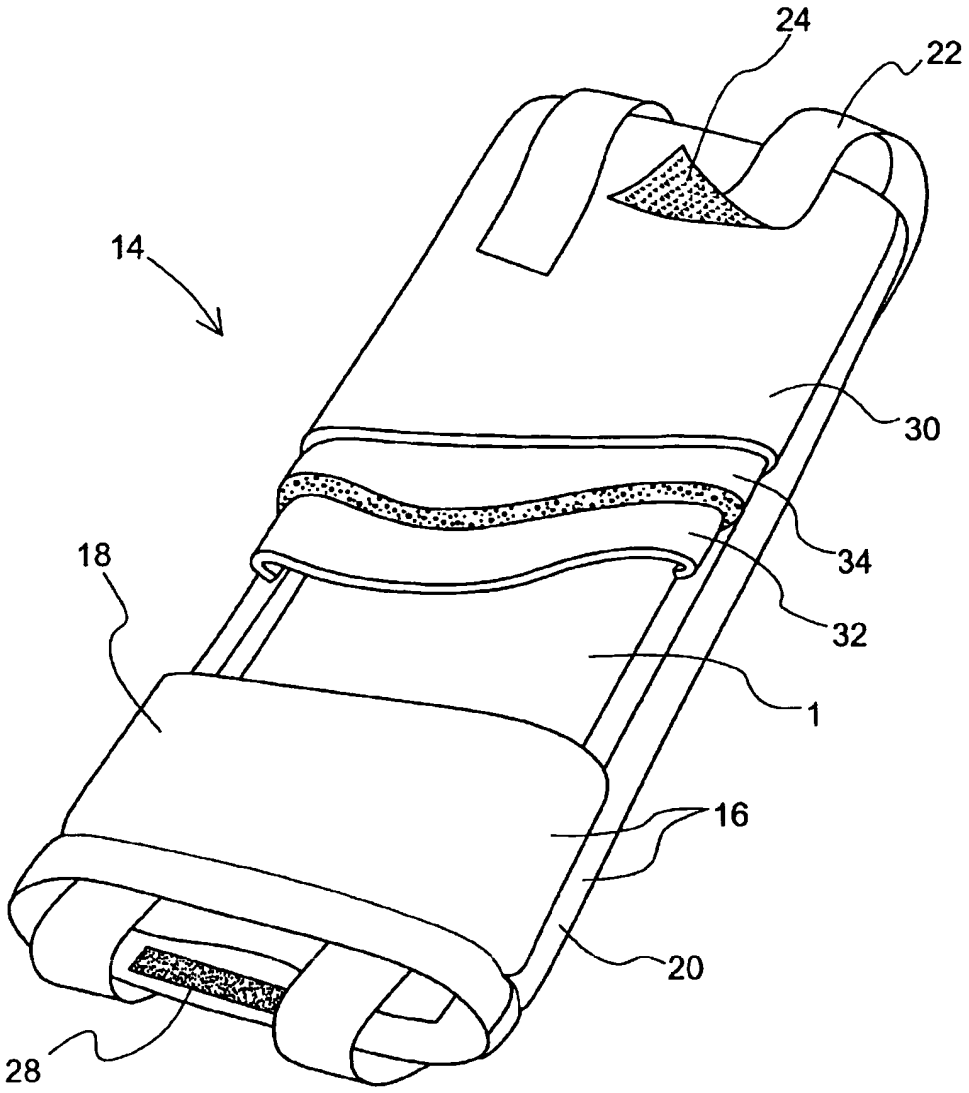


FIGURE 2

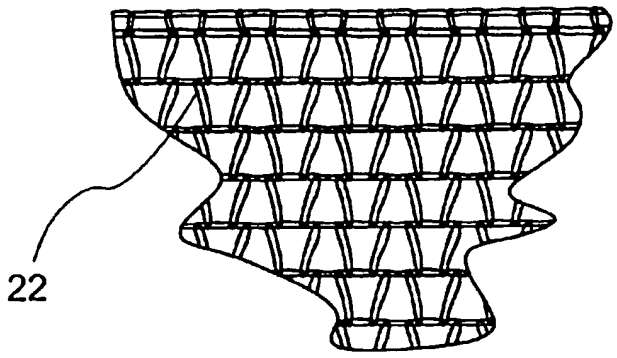


FIGURE 3

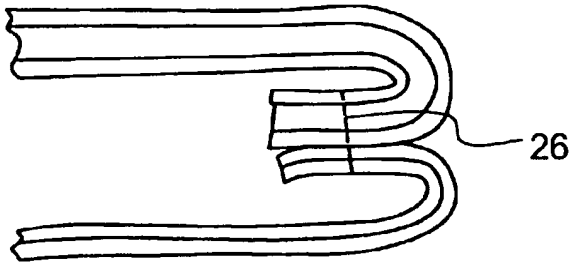


FIGURE 4

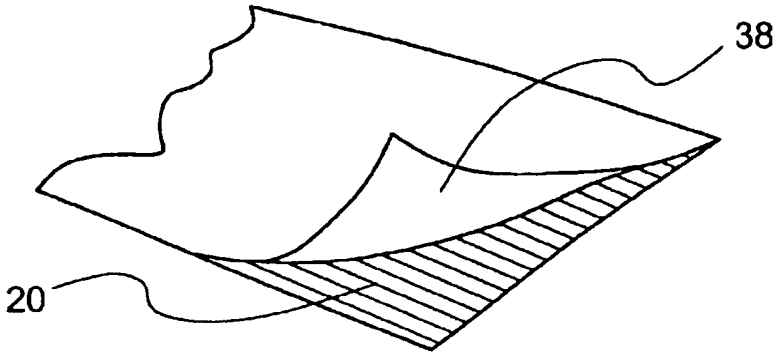
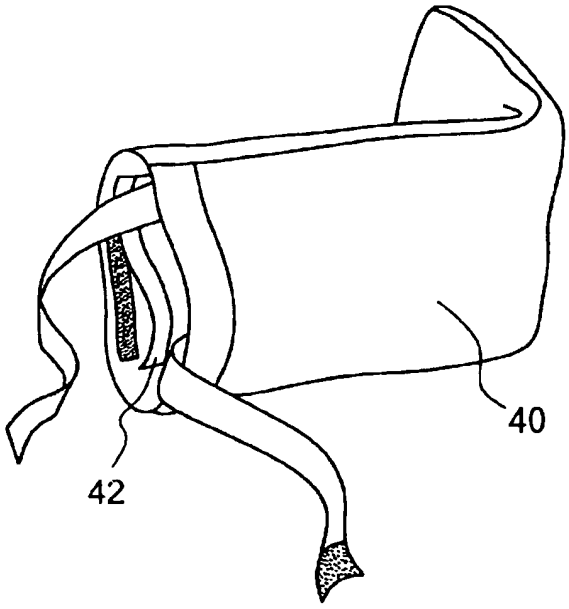


FIGURE 5



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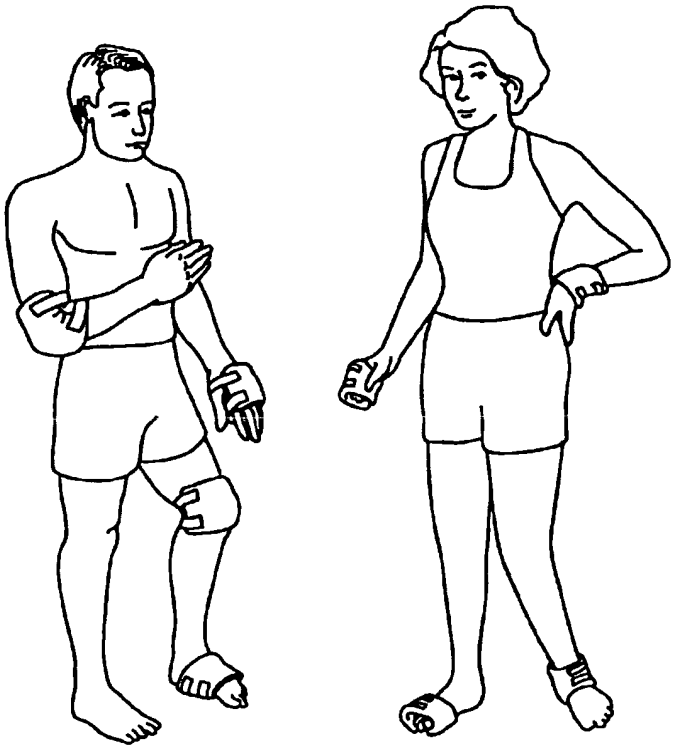

FIGURE 7

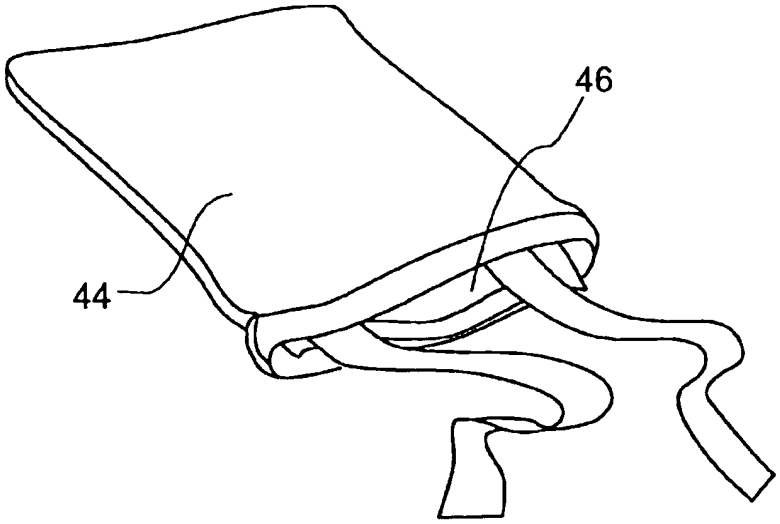

FIGURE 8

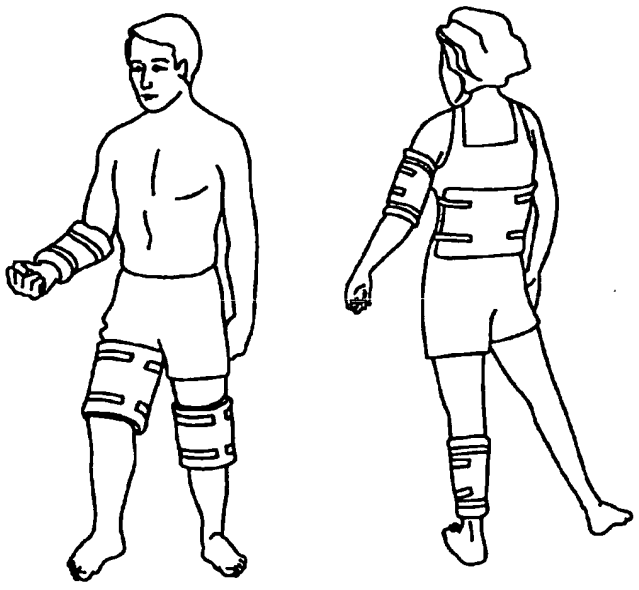

FIGURE 9

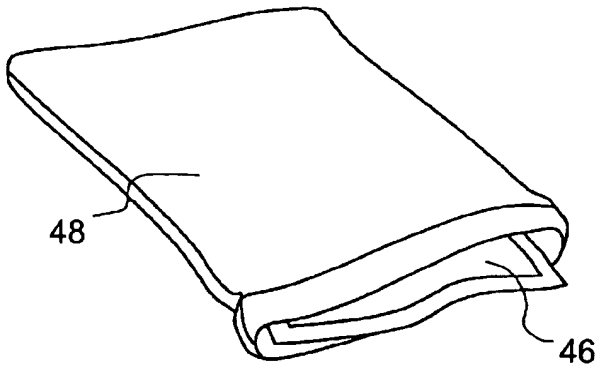

FIGURE 10

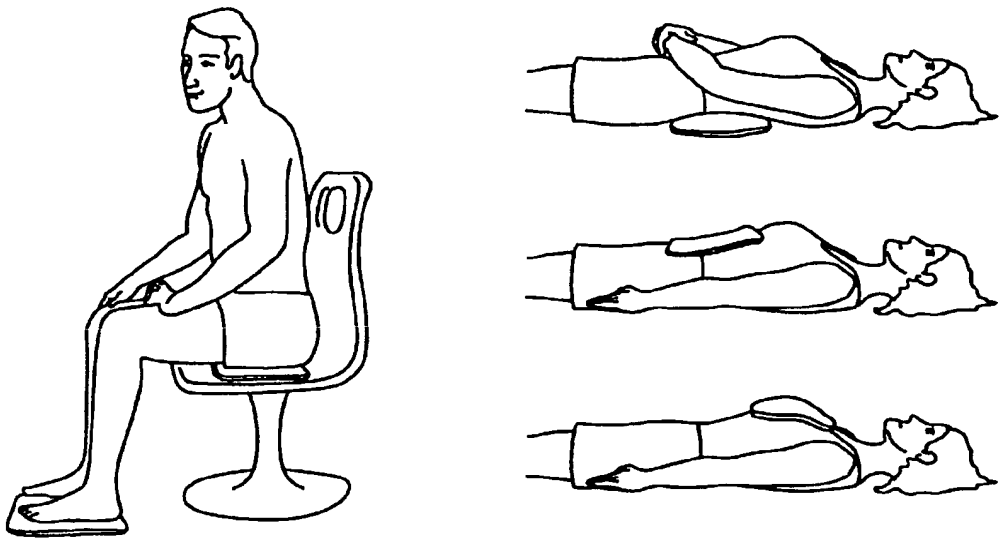

FIGURE 11

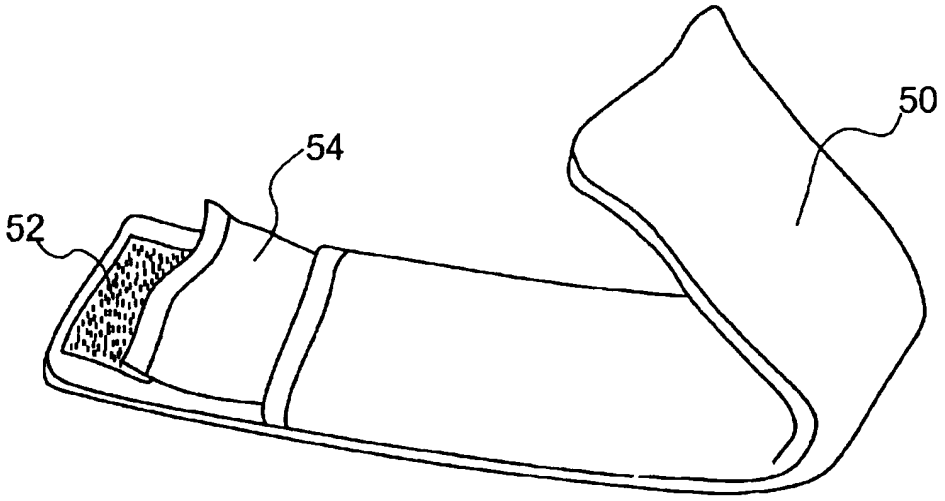

FIGURE 12

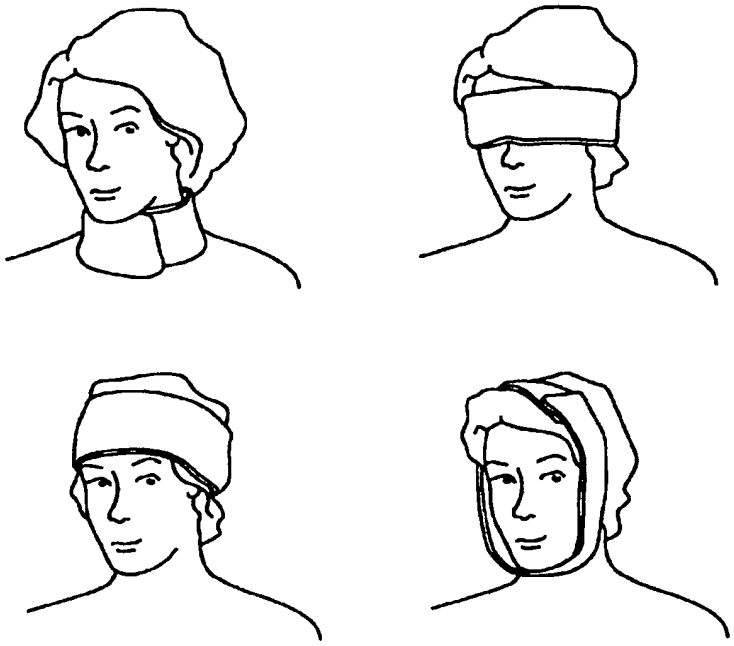

FIGURE 13

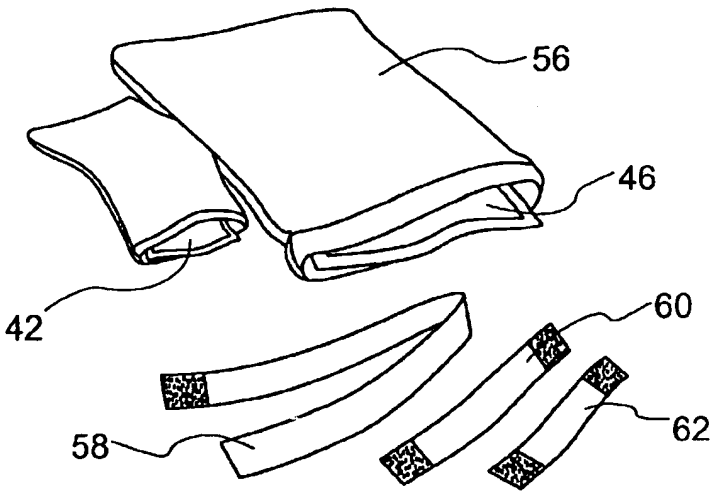

FIGURE 14

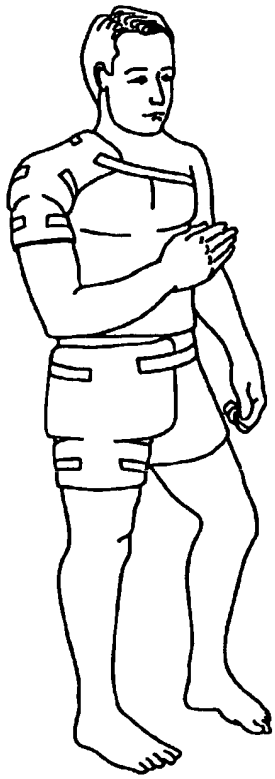

FIGURE 15

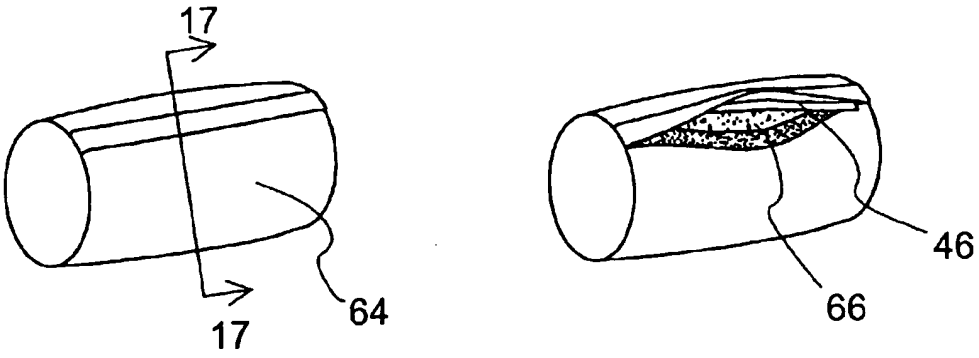

FIGURE 16

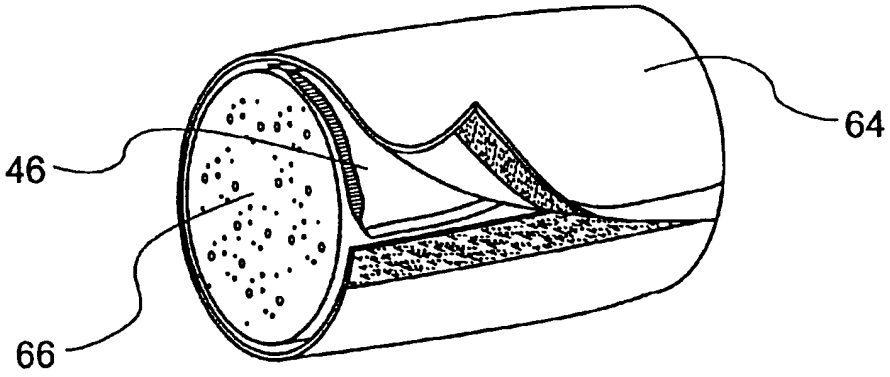

FIGURE 17

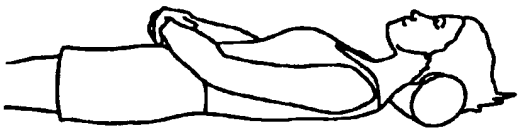

FIGURE 18

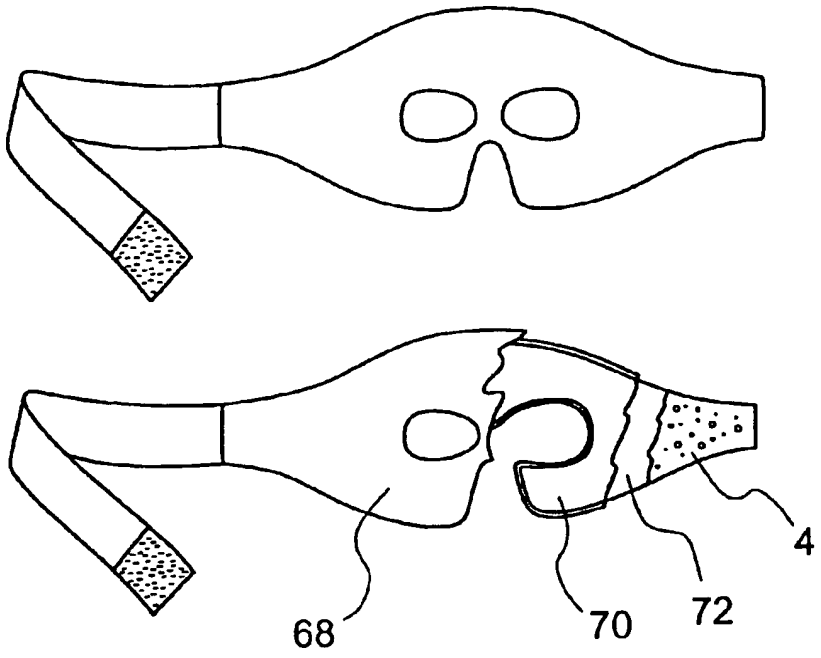

FIGURE 19

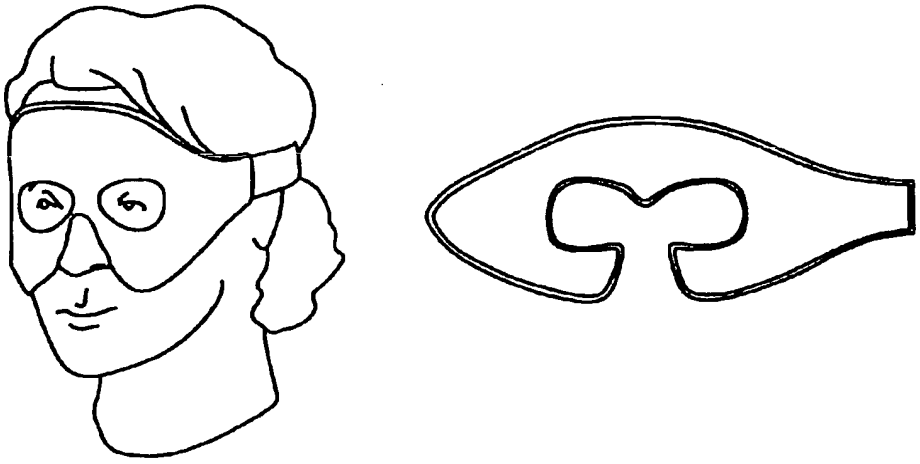

FIGURE 20

REUSABLE HOT/COLD THERAPEUTIC COMPRESS APPLIANCE

This application claims the benefit of U.S. Provisional application Ser. No. 60/013,935, filed Mar. 22, 1996.

FIELD OF THE INVENTION

This invention relates in general to therapeutic devices, and more particularly to appliances suitable for hot and cold compress therapy.

BACKGROUND OF THE INVENTION

Hot and cold compress therapy is an increasingly recognized medical technique for the successful treatment of many injuries. In general, hot compress therapy is used in cases of chronic ailments to relieve pain, increase blood flow, decrease joint stiffness, relieve muscle spasms and cramps, and increase the extensibility of scar tissue. Cold compress therapy is typically applied within approximately 72 hours following trauma or injury (such as laceration, sprains, strains, insect bits, and minor burns) to decrease blood flow, thereby helping to reduce localized pain and swelling. By containing the severity of swelling, cold compress therapy can have a significant impact on the healing process and speed of recovery.

An important factor influencing the therapeutic value of an appliance used for hot and cold compress therapy is its ability to maintain a hot or cold temperature, with minimal temperature fluctuation, for a therapeutically significant period of time—typically about 20 to 30 minutes. Another important factor influencing the therapeutic value of an appliance used for hot and cold compress therapy is its ability to provide a safe and tolerably comfortable level of compression. Other important and advantageous characteristics of appliances used for hot and cold compress therapy include convenience of use (which may be enhanced by providing a custom "hands-off" fit so that the appliance may be worn while the patient remains mobile, and by providing an appliance that may be used on several different areas of the body), and the ability to create a family of hot and cold compress appliances for application to many parts of the body while utilizing a minimum number of differently configured packages of heating or cooling material.

Although hot and cold compress appliances in general are known, none of the prior-known compress appliances adequately meet the foregoing therapeutic and practical objectives.

SUMMARY OF THE INVENTION

Described herein is a family of appliances intended for hot and cold compress therapy, the individual members of which encompass some or all of the following set of characteristics forming a partial list of features improving or enhancing the therapeutic and commercial value of appliances intended for use in hot and cold compress therapy:

a) selected composition of the heating and cooling material such that it maintains a relatively constant temperature for a therapeutically significant period of time;

b) vacuum-packing of the heating and cooling material;

c) composition and insulative properties of materials surrounding the heating and cooling material such that excessive heat is not lost to nor absorbed from the ambient surroundings;

d) provision of a safe and tolerably comfortable level of compression through choice of materials used to construct the appliance and/or through provision of elastic straps of suitable length and tensile strength;

e) the ability to repeatedly heat and cool the entire appliance without deterioration of the appliance of the heating and cooling material;

f) convenience of use through the provision of means to achieve a custom fit; and,

g) the ability to create a family of useful appliances using only a limited number of different sizes of heating and cooling material packages.

It will be understood that, for any given appliance of the family intended for hot and cold compress therapy, as many of these characteristics as are consistent with function of the particular appliance may be included, so as to maximize the therapeutic and commercial advantage of that appliance. However, it will be further understood that one or several of these characteristics may be selectively omitted from any given appliance of the family for ease of manufacture, economic or other reasons.

Factors that affect the heat transfer characteristics of an appliance used for hot and cold compress therapy may include: (a) composition of the heating or cooling material—preferably a gel; (b) the presence or absence of air in and around the heating and cooling material; and (c) the presence or absence of insulating materials surrounding the heating or cooling material on one or more sides and, if present, their structure and composition. Preferably, the temperature fluctuation of the heat (or cold) applied to a treated area by an appliance used for hot and cold compress therapy should not exceed about 1° Celsius over a therapeutically significant period of time. The ability of a hot and cold compress appliance to provide a safe and tolerably comfortable level of compression may be facilitated through the choice of materials used to construct the appliance, as well as through the provision of elastic straps of suitable length and tensile strength to be used to hold the appliance to the injured body part.

It is possible to devise a relatively large family of useful appliances suitable for application to a large number of body parts for adults and at least larger children with the use of a single size and configuration of hot/cold pouch (containing the heating or cooling material) removably insertable into a suitably designed sleeve, as will be hereinafter described. A larger family of appliances in accordance with the invention may be provided by using, in addition to the sealed pouch size aforesaid, a somewhat larger pouch suitable for use with larger body areas to be treated, or with appliances whose shape necessitates the use of a larger size pouch than the minimum size. For a yet larger family of appliances, one or more larger or smaller sizes of pouch and sleeve may be used, but three different sizes have been found to be sufficient to treat most injuries. Further, some appliances may be designed to incorporate two or more sleeves, at least one of which is dimensioned to receive the large of two pouches, and at least one other of which is dimensioned to receive the smaller of two pouches.

Desirably, each pouch is vacuum-sealed and any printed matter thereon appears on a layer of plastic within the pouch that is visible through one or more overlying layers of transparent or near-transparent plastic. The outer layers of the pouch should be made of materials chosen to be non-allergenic and non-toxic. As pigments used in printing are sometimes allergenic or toxic, they should be disposed within or under overlying materials that themselves are neither toxic nor allergenic. Equally, other materials used in the construction of the sleeves and strapping to be described should be chosen to be non-allergenic and non-toxic.

Another important characteristics of all materials selected for use in appliances according to the invention is that they be readily heatable in a microwave oven, and readily coolable in a household freezer without damage so that repeated freezing or heating may be possible without serious deterioration over a relatively large number of uses of the appliance.

The sleeve in which the pouch is inserted should be designed to have a patient-contact surface selected to transfer heat readily as between the patient and the pouch without causing the skin of the patient to reach an uncomfortably extreme temperature. A woven nylon layer has been found suitable for such purpose; other materials of course could be chosen consistent with the foregoing criteria. The pouch within the sleeve makes immediate contact with this patient-contact surface of the sleeve, which in turn, as mentioned, makes direct contact with the treated area of the body of the patient. Preferably, that portion of the sleeve in contact with the opposed surface of the pouch not making contact with the patient-contact surface is relatively well insulated, as by the insertion of an insulating foam layer or the like interposed between the pouch and the outer surface of the sleeve opposite the patient-contact surface. That outer surface of the sleeve is preferably selected to be of a material to which a Velcro® or other similar multi-hooked plastic fastener will readily adhere. This characteristic is important in order that the strapping to be used in association with the sleeve can be attached to virtually any portion of this outer surface layer of the sleeve.

Preferably, there is a sleeve opening at one end of the sleeve into which the pouch may be inserted, and is itself closeable by means of a Velcro® or equivalent fastener. In most cases the pouch and the overall configuration of the sleeve can be formed as a somewhat rounded flexible parallelepiped, whose shape and configuration can be adjusted to conform to the limb or body surface of the patient undergoing treatment. All materials used in the pouch and the sleeve should be selected to permit such flexibility. The overall shape and size of a smaller pouch (or the only pouch if only one pouch is used in the family of appliances) should be sufficient to cover most of the surface of a knee, elbow, hand or foot (and thus necessarily a wrist or ankle) thereby affording capability of therapeutic use of the most commonly injured body parts. However, for larger injured body parts, such as thighs and portions of the back or chest, a larger pouch and sleeve combination is preferred. The size is to a great extent arbitrary, but typically a size that wraps most of the way around the thigh and extends from just above the knee to just below the groin will be acceptable. Smaller sizes for children or smaller body portions needed treatment, or longer sizes for ease of wrapping around large body portions (e.g. the head) may be also used as required.

Of course, other pouch sizes may be used, and in some cases a particular sleeve may be configured to hold two or more pouches. For example, a pouch that would fit completely around the neck would typically have to be longer than the smallest sized pouch described above; accordingly it may be desirable to use two contiguous pouches aligned end to end within a single elongated sleeve suitable for wrapping around the neck or head, or else a single longer pouch, as mentioned.

Equally, it is possible within the scope of the invention to combine sleeves of different sizes and pouches of different sizes to accommodate injuries that involve a larger body surface area and a more or less contiguous smaller body area. For example, if the upper arm and the shoulder are injured, a larger size sleeve and pouch could be used on the shoulder, and a smaller sized sleeve and pouch could be used on the upper arm. The two sleeves could be joined to one another as by stitching in order to facilitate the use of the combined appliance.

In some cases, the appliance may not be intended to be strapped to the user. For example, the appliance could be in the form of a cushion or pillow against which the patient rests a portion of the body, such as the head. In such case, the appliance may preferably be designed as having an inner resilient foam core, a pouch surrounding the foam core, and one or more layers interposed between the pouch and the user. Depending upon the intended use of any such appliance, the pouch could occupy a greater or lesser peripheral portion of such appliance, and the outer layer of such appliance could be selected to be of greater or lesser heat-transfer characteristics than might be preferred for an appliance strapped to the patient.

For those appliances that are strapped to the patient, it is desirable that the manner of strapping not be impeded by any arbitrary constraints. Accordingly, fixed-position buckles and the like should be avoided. Furthermore, the length of strapping should be selected so that the patient is able to attach and release the appliance to the injured part of the body with minimum difficulty—this in turn implies that the area in which one end of the strap makes constraining contact with the sleeve or other end of the strap (or of another strap) should be readily adjustable to accommodate the ease of reach of the patient. This in turn suggests that optimal design would permit the patient to adhere the strap to virtually any portion of the upper surface area of the appliance. This objective strongly indicates a preference for Velcro®-type fasteners on the strapping so that the straps may be adhered to any selected portion of the Velcro®-compatible outer layer of the sleeve. Further, the lengths of strapping should be chosen such that when the strapping is wrapped around that portion of the body required to constrain the appliance next to the body, only a slight surplus of the strapping is available for adherence to the appliance. Obviously some excess of length of the strapping will exist when the appliance is mounted on a relatively small portion of the patient's body, such as a wrist, since the same appliance may also have to be used for other larger parts of the patient's body such as the knee. But if the strapping is readily positionable, and the point of adherence of the strap to the appliance is not confined to only a small number of attachment points on the appliance, then an adequate choice of strap-attachment position is ordinarily possible. If desired, the strapping itself may be provided with additional Velcro® fasteners or similar adhesion means so that a trailing end of the fastener could be looped and affixed to the strap itself instead of to the sleeve.

The strapping should be readily easily stretchable, and is preferably selected to be of a readily stretchable rubber or suitable elastomer. It should not be selected to be of a relatively stiff, non-stretchable material (such as neoprene, for example). The amount of tension in the strapping is readily adjustable by selecting the point of attachment of the free end of the strapping on the outer surface of the sleeve. Accordingly, it is readily possible for the patient to adjust the tension to suit the therapeutic objective and the patient's own comfort. It has been found that stretchability permitting up to about a 50% increase in length in fully-stretched condition relative to rest condition of the strapping is appropriate.

Although most materials are adequately flexible for use in appliances of the sort described when warm, there is a

tendency of many materials to become relatively inflexible when cold. Consequently, special care has to been taken in accordance with the invention to select the materials for the heating/cooling material for use in cold compress situations. The heating/cooling material should not become unduly stiff or inflexible when used as such, bearing in mind that the temperature range in household freezers can vary considerably from one freezer to another. Preferably the heating/cooling material is a gel that maintains a flexible consistency even at the lower extreme of freezer temperatures. There is little consensus among health care professionals as to what degree of cold flexibility is necessary or helpful in a cold compress appliance, so in certain applications one may wish to use a gel including up to about 40% propylene glycol as an antifreezer, but I prefer that the gel material include up to about 30% of propylene glycol for this purpose, and that cellulosic material rather than starch be used as a dispersion medium. Further particulars of preferred heating/cooling material formulations appear later in this specification. Propylene glycol is particularly advantageous in that it inhibits bacterial growth and helps to retain moisture in the pouch, as well as having the previously mentioned desirable non-allergenic, non-toxic and water soluble characteristics.

For greater acceptance and use by children of one or more of the appliances described herein, it will be clear that animating appendages such sa ears and a tail could readily be added to such appliance(s). In addition, one or more of the appliances described herein may clearly have application, with or without alterations, to equestrian or other animal patients.

BRIEF DESCRIPTION OF THE DRAWINGS

A detailed description of preferred embodiments of the invention is provided herein below with reference to the following schematic illustrations, in which:

FIG. **1**, in a partially sectional isometric view, illustrates a reusable sealed hot/cold pouch in accordance with a preferred embodiment of the present invention;

FIG. **2**, in a partially sectional isometric view showing a hot/cold compress appliance in accordance with a preferred embodiment of the present invention, illustrates the structure of the outer shell of the sleeve portion of the appliance;

FIG. **3** is an enlarged fragmentary view of the elastic strapping of the hot/cold compress appliance of FIG. **2** that illustrates the fully-stretched structure of the elastic strapping;

FIG. **4**, in an enlarged fragmentary sectional view, illustrates the side seam of the sleeve portion of the hot/cold compress appliance of FIG. **2**;

FIG. **5**, in an enlarged fragmentary view, illustrates the structure of the patient-contact surface of the sleeve portion of the hot/cold compress appliance of FIG. **2**;

FIG. **6**, in a perspective view, illustrates a small hot/cold compress appliance in accordance with a preferred embodiment of the present invention;

FIG. **7**, in a front elevation view, illustrates the small hot/cold compress appliance of FIG. **6** as worn in representative positions on the body of a user;

FIG. **8**, in an isometric view, illustrates a large hot/cold compress appliance in accordance with a preferred embodiment of the present invention;

FIG. **9**, in an elevation view, illustrates the large hot/cold compress appliance of FIG. **8** as worn in representative positions on the body of a user;

FIG. **10**, in an isometric view, illustrates a hot/cold compress appliance in accordance with a preferred embodiment of the present invention;

FIG. **11**, in a side elevation view, illustrates the hot/cold compress appliance of FIG. **10** as applied to representative portions of the body of a user;

FIG. **12**, in a perspective view, illustrates a hot/cold compress appliance in accordance with a preferred embodiment of the present invention;

FIG. **13**, in a front elevation view, illustrates the hot/cold compress appliance of FIG. **12** as worn in representative positions on the head and neck of a user;

FIG. **14**, in a partially exploded perspective view, illustrates a hot/cold compress appliance in accordance with a preferred embodiment of the present invention;

FIG. **15**, in a front elevation view, illustrates the hot/cold compress appliance of FIG. **14** as worn in representative positions on the body of a user;

FIG. **16**, in an isometric view, illustrates a hot/cold compress appliance in accordance with a preferred embodiment of the present invention;

FIG. **17**, in a cross-sectional view taken along line **17—17** in FIG. **16**, illustrates the internal structure of the hot/cold compress appliance of FIG. **16**;

FIG. **18**, in a side elevation view, illustrates the hot/cold compress appliance of FIG. **16** as applied to the body of a user;

FIG. **19**, in a partially sectional isometric view showing a hot/cold compress appliance in accordance with a preferred embodiment of the present invention, illustrates the structure of the appliance; and,

FIG. **20**, in a front elevational view, illustrates the hot/cold compress appliance of FIG. **19** as worn on the face of a user.

In the drawings, preferred embodiments of the invention are illustrated by way of example. It is to be expressly understood that the description and drawings are only for the purpose of illustration and as an aid to understanding, and are not intended as a definition of the limits of the invention.

DETAILED DESCRIPTION

Referring to FIG. **1**, there is illustrates in a partially sectional isometric view a reusable sealed hot/cold pouch in accordance with a preferred embodiment of the present invention. The pouch illustrated and generally designated **1** comprises strong flexible plastic material **2** containing pliable heat absorbing material **4**, and is preferably microwaveable and able to endure both freezing and near-boiling temperatures.

Sealed pouch **1** is preferably vacuum-sealed and hypoallergenic, and is preferably constructed of inner layer **6** and substantially transparent outer layer **8**, laminated together with adhesive layer **10**. Inner layer **6** is preferably constructed of 3 mm linear density polyethylene, onto which may be set printing **12**, and is coated with adhesive layer **10**, preferably comprising Adcote® 533/522B. Adhesive layer **10** is in turn enveloped by outer layer **8**, preferably constructed of 75 gauge Nylon.

In accordance with one preferred embodiment of the present invention, sealed pouch **1** has a length of about 10 inches and a width of about 5 inches. In accordance with another preferred embodiment of the present invention, sealed pouch **1** has a length of about 15 inches and a width of about 10 inches. In accordance with yet another preferred embodiment of the present invention, sealed pouch **1** has a length of about 24 inches and a width of about 3.5 inches.

Heat absorbing material **4** preferably has a relatively high specific heat capacity in order to maintain a given tempera-

ture for a lengthy period of time, remains pliable when subjected to freezing temperatures on the order of those that may be expected to be encountered in domestic or commercial freezers, is non-toxic, is bacteriostatic, is hydroscopic to avoid crystallization, and is sufficiently stable to withstand repeated heating and freezing. In accordance with a preferred embodiment of the present invention, heat absorbing material **4** comprises a gel substantially consisting of about 25% USP grade propylene glycol so as to maintain a gel freezing point of about -10° Celsius, about 22% Methocel® K15M hydroxypropyl methylcellulose as a colloidal dispersion medium, and about 53% filtered water. Preferably, heat absorbing material **4** does not contain any colouring, dyeing, or bittering agents. Gel constitutions of heat absorbing material **4** having about 20%–40% 1,2-propylene glycol or a like ratio of one or more homologs of 1,2-propylene glycol, and about 22% hydroxypropyl methylcellulose or a like ratio of other cellulose-based colloidal dispersion media, with the remaining ratio satisfied with filtered water are also contemplated.

Referring to FIG. **2**, there is illustarted in a partially sectional isometric view a hot/cold compress appliance in accordance with a preferred embodiment of the present invention. The hot/cold compress appliance illustrated and generally designated **14** comprises sleeve **16** surrounding sealed pouch **1**. Sleeve **16** generally comprises outer adherent surface **30**, patient-contact surface **20**, and insulant **34**. In a preferred embodiment, outer adherent surface **30** and insulant **34** are combined in a single outer shell **18**, and elastic strapping **22** with Velcro® fastening hook **24** is affixed to the distal end thereof. As is best seen in FIGS. **2** and **4**, outer shell **18** of sleeve **16** is preferably joined permanently to patient-contact surface **20** of sleeve **16** on three sides by stitching **26** or by RF sealing, with the fourth side being re-sealably openable by engagement and disengagement of Velcro® fastening hook **28** with outer shell **18**, in order to permit access to sealed pouch **1**.

Outer shell **18** preferably comprises outer adherent surface **30**, inner surface **32**, and insulating core **34** between outer adherent surface **30** and inner surface **32** to limit heat transfer between sealed pouch **1** and the ambient surroundings through outer shell **18**. Outer adherent surface **30** preferably engages Velcro® fastening hook **24** at any point along outer adherent surface **30** in order that hot/cold compress appliance **14** may be worn with a therapeutic level of compression around various areas of the patient's body, and in order that differences in size of individual user of hot/cold compress appliance **14** may be accommodated. In accordance with a preferred embodiment of the present invention, outer shell **18** of sleeve **16** comprises Veltex Bright® laminated loop fabric to enable the engagement of Velcro® fastening hook **24** at any point along outer adherent surface **30** of outer shell **18**, inner surface **32** comprises nylon tricot backing, and insulating core **34** comprises polyester foam having a thickness of about 0.135 inches.

Patient-contact surface **20** is preferably hypoallergenic, and preferably increases user comfort by easing the shock of application to the body of a user of sealed pouch **1**. In accordance with a preferred embodiment of the present invention, patient-contact surface **20** comprises 210 denier Nylon **36** coated on its inner surface with urethane **38** to prevent transfer to the user of condensation that may develop on the surface of sealed pouch **1**.

Elastic strapping **22** is of a length suitable to attach hot/cold compress appliance **14** with a therapeutic level of compression to various areas of the body and to accommodate differences in size of individual users of hot/cold compress appliance **14**, and is preferably microwave and laundry detergent safe. As best illustrated in FIGS. **2** and **3**, in accordance with a preferred embodiment of the present invention, elastic strapping **22** comprise knit 1/150 polyester and 34-gauge extruded rubber, having a stretch of 140%.

As is best seen from FIGS. **6** through **20**, for application to different parts of the body, hot/cold compress appliance **14** may be constructed to varying dimensions suited to accept one or more sealed pouches **1** having shape and size in accordance with the above-described preferred embodiments of sealed pouch **1** or other shapes and sizes as may be dictated by the anatomy desired to be treated. Preferably, a family of hot/cold compress appliances **14** created for application to all parts of the body will accept a minimum number of different shapes and sizes of sealed pouches **1**, preferably having shape and size in accordance with the above-described preferred embodiments of sealed pouch **1**. In a preferred embodiment of the present invention, a family of hot/cold compress appliances **14** for application to all parts of the anatomy that accepts one or more sealed pouches **1** having shape and size in accordance with the three above-described preferred embodiments of sealed pouch **1** is provided.

Illustrated in FIGS. **6** and **7** in perspective view and in front elevation view respectively is small hot/cold compress appliance **40**, preferably containing sealed hot/cold compress pouch **42** having a length of about 10 inches and a width of about 5 inches, for application to the elbow, wrist, hand, fingers, knee, foot, ankle, and toes.

Illustrated in FIGS. **8** and **9** in isometric view and in elevation view respectively is large hot/cold compress appliance **44**, preferably containing sealed hot/cold compress pouch **46** having a length of about 15 inches and a width of about 10 inches, for application to the thigh, hamstring, knee, torso, arm, shin, and calf.

Illustrated in FIGS. **10** and **11** in isometric view and in side elevation view respectively is seat-back hot/cold compress appliance **48**, preferably containing sealed hot/cold compress pouch **46** having a length of about 15 inches and a width of about 10 inches, for application to the abdomen, seat, chest, and feet.

Illustrated in FIGS. **12** and **13** in perspective view and in front elevation view respectively is head-neck hot/cold compress appliance **50**, having Velcro® fastening hook **52** and preferably containing sealed hot/cold compress pouch **54** having a length of about 24 inches and a width of about 3.5 inches, for application to the head and neck.

Illustrated in FIGS. **14** and **15** in partially exploded perspective view and in front elevation view respectively is shoulder-hip hot/cold compress appliance **56**, preferably containing sealed hot/cod compress pouch **42**, having a length of about 10 inches and a width of about 5 inches, and sealed hot/cold compress pouch **46** having a length of about 15 inches and a width of about 10 inches, for application to the shoulder/upper arm and hip/upper thigh. Elastic strapping **58**, **60**, and **62** is preferably completely detachable form shoulder-hip hot/cold compress appliance **56** to accommodate diverse placement of elastic strapping **58**, **60**, and **62** on appliance **56** during use.

Illustrated in FIGS. **16**, **17**, and **18** in isometric view, cross-sectional view taken along line **17**—**17** in FIG. **16**, and side elevation view respectively is cervical pillow hot/cold compress appliance **64**, preferably containing hot/cold compress pouch **46** having a length of about 15 inches and a width of about 10 inches, for application to the back of the neck for treatment of neck and back pain, headache, fever,

muscle spasm, or cramps. Cervical pillow hot/cold compress appliance **64** is preferably about 15 inches in length and about 5.5 inches in diameter, and contains, in addition to hot/cold compress pouch **46**, polyurethane foam core **66** having an Indentation Load Deflection of about 141 lbs (1.1 lbs. per square foot). Cervical pillow hot/cold compress appliance **64** preferably conserves heat or cold for a minimum of four hours.

Illustrated in FIGS. **19** and **20**, in partially sectional isometric view and front elevation view respectively, is face pad hot/cold compress appliance **68**, preferably containing hot/cold compress pouch **70** permanently affixed therein. Hot/cold compress pouch **70** preferably comprises ultrasonically RF sealed 10-gauge frosted vinyl pouch **72** containing gel **4**.

I claim:

1. A reusable hot/cold therapeutic compress appliance for one of heating and cooling a treated area of the body of a patient, said reusable hot/cold therapeutic compress appliance comprising:

a) a sealed pouch comprising a strong flexible plastic material and containing a pliable heat absorbing material, the mass, dimensions, and specific heat capacity of said sealed pouch containing said pliable heat absorbing material being selected such that at standard temperature and pressure (STP) said sealed pouch containing said heat absorbing material will maintain a temperature (over the range from about 0° Celsius to about 60° Celsius) within at least about 10° Celsius for a time of at least about 20 minutes;

b) a sleeve for containing said sealed pouch, said sleeve comprising:

i) a relatively heat-conductive patient-contact surface for placement over the treated area selected to facilitate the maintenance of a relatively constant temperature gradient across said patient-contact surface,

ii) an outer adherent surface adjacent the patient-contact surface,

iii) and an insulant disposed between said outer adherent surface and said sealed pouch (contained within said sleeve) in order to reduce heat transfer between said sealed pouch and said outer adherent surface; and,

c) attachment means associated with said sleeve, said attachment means being co-operatively configured so as to releasably adhere to any location on said outer adherent surface, whereby the patient using said compress appliance may select a location of adherence so as to provide a comfortable and therapeutic compressive loading to the treated area.

2. The reusable hot/cold therapeutic compress appliance of claim **1** wherein said attachment means comprise at least one elongate elastic strap having a fixed end affixed to said sleeve and a free end, said at least one elastic strap being co-operatively configured proximate to said free end so as to releasably adhere to any location on said outer adherent surface, said at least one elastic strap further being of a length and tensile strength such that a comfortable and therapeutic compressive loading of the treated area may be achieved with the compress appliance when the compress appliance is placed over the treated area and said free end of said at least one elastic strap is attached to said outer adherent surface at a location of adherence selected by the patient.

3. The reusable hot/cold therapeutic compress appliance of claim **1** in which said attachment means comprise at least one elongate detachably attachable elastic strap being co-operatively configured proximate to both ends so as to releasably adhere to any location on said outer adherent surface, said at least one detachably attachable elastic strap further being of a length and tensile strength such that a comfortable and therapeutic compressive loading of the treated area may be achieved when said compress appliance is placed over the treated area and said both ends of said at least one detachably attachable elastic strap are attached to said outer adherent surface at locations of adherence selected by the patient.

4. The reusable hot/cold therapeutic compress appliance of claim **1** wherein said pliable heat absorbing material is vacuum-packed within said sealed pouch in order that heat transfer between said pliable heat absorbing material and said sealed pouch may be substantially uniform at all points along said sealed pouch.

5. The reusable hot/cold therapeutic compress appliance of claim **1** wherein said pliable heat absorbing material comprises a gel substantially consisting of about 20–30% 1,2-propylene glycol and about 22% of a cellulose-based colloidal dispersion media, with the remaining ratio satisfied with water, so that said gel remains pliable when subjected to temperatures on the order of those that may be expected to be encountered in domestic and commercial freezers.

6. The reusable hot/cold therapeutic compress appliance of claim **5** wherein said pliable heat absorbing material comprises a gel substantially consisting of about 25% USP grade 1,2-propylene glycol and about 22% hydroxypropyl methylcellulose, with the remaining ratio satisfied with filtered water, in order that said gel may have a freezing point of about −10° Celsius.

7. The reusable hot/cold therapeutic compress appliance of claim **1** wherein said sealed pouch is removably contained within said sleeve.

8. The reusable hot/cold therapeutic compress appliance of claim **1** wherein said outer adherent surface and said insulant are combined in a single outer shell.

9. The reusable hot/cold therapeutic compress appliance of claim **8** wherein said insulant within said outer shell comprises polyester foam in order that said outer shell be capable of withstanding without damage such freezing temperatures as may be expected to be encountered in domestic or commercial freezers, as well as being capable of withstanding heating in a microwave oven without damage.

10. The reusable hot/cold therapeutic compress appliance of claim **1** in which said patient-contact surface comprises a nylon material so that said patient-contact surface may be substantially hypo-allergenic.

11. The reusable hot/cold therapeutic compress appliance of claim **10** wherein said nylon material is associated with a relatively moisture-impermeable substance in order to impede the passage of moisture through said patient-contact surface.

12. The reusable hot/cold therapeutic compress appliance of claim **1** wherein said plastic material of said sealed pouch comprises an inner plastic layer upon which printing may be set, and an outer substantially transparent plastic layer affixed to said inner plastic layer with an adhesive, in order that potentially allergenic or toxic pigments used to form said printing do not come into contact with the patient using said compress alliance.

13. The reusable hot/cold therapeutic compress appliance of claim **2** wherein said at least one elastic strap has a maximal stretch of about 140%.

14. The reusable hot/cold therapeutic compress appliance of claim **3** wherein said at least one detachably attachable elastic strap has a maximal stretch of about 140%.

15. The reusable hot/cold therapeutic compress appliance of claim 2 wherein said at least one elastic strap comprises knit polyester and rubber in order that said at least one elastic strap may be capable of withstanding without damage such freezing temperatures as may be expected to be encountered in domestic or commercial freezers, as well as being capable of withstanding heating in a microwave oven without damage.

16. The reusable hot/cold therapeutic compress appliance of claim 3 wherein said at least one detachably attachable elastic strap comprises knit polyester and rubber in order that said at least one detachably attachable elastic strap may be capable of withstanding without damage such freezing temperatures as may be expected to be encountered in domestic or commercial freezers, as well as being capable of withstanding heating in a microwave oven without damage.

17. A family of reusable hot/cold therapeutic compress appliances for application to a large number of different treated areas on the body of a patient, each said compress appliance of said family comprising:

a) at least one sealed pouch of a standard size and configuration, said at least one sealed pouch comprising a strong flexible plastic material and containing a pliable heat absorbing material, the mass, dimensions, and specific heat capacity of said sealed pouch containing said pliable heat absorbing material being selected such that at standard temperature and pressure (STP) said sealed pouch containing said heat absorbing material will maintain a temperature (over the range from about 0° Celsius to about 60° Celsius) within at least about 10° Celsius for a time of at least about 20 minutes; and,

b) at least one sleeve for containing said at least one sealed pouch, said sleeve comprising:

i) a relatively heat-conductive patient-contact surface for placement over the treated area,

ii) an outer adherent surface adjacent the patient-contact surface,

iii) and an insulant disposed between said outer adherent surface and said at least one sealed pouch (contained within said sleeve) in order to reduce heat transfer between said at least one sealed pouch and said outer adherent surface;

wherein said sleeves of all members of the family are dimensioned to receive an integral number of said at least one sealed pouch of a standard size and configuration.

18. The family of reusable hot/cold therapeutic compress appliances of claim 17 wherein two different sizes and configurations of said at least one sealed pouch are provided.

19. The family of reusable hot/cold therapeutic compress appliances of claim 18 wherein the dimensions of said at least one sealed pouch are one of about 10×5 inches and about 15×10 inches.

20. The family of reusable hot/cold therapeutic compress appliances of claim 17 wherein three different sizes and configurations of said at least one sealed pouch are provided.

21. The family of reusable hot/cold therapeutic compress appliances of claim 18 wherein the dimensions of said at least one sealed pouch are one of about 10×5 inches, about 15×10 inches, and about 24×3.5 inches.

* * * * *

US 20020073731A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2002/0073731 A1

Bride-Flynn (43) Pub. Date: Jun. 20, 2002

(54) DISPOSABLE ICE PACK

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(21) Appl. No.: 09/737,323

(22) Filed: Dec. 14, 2000

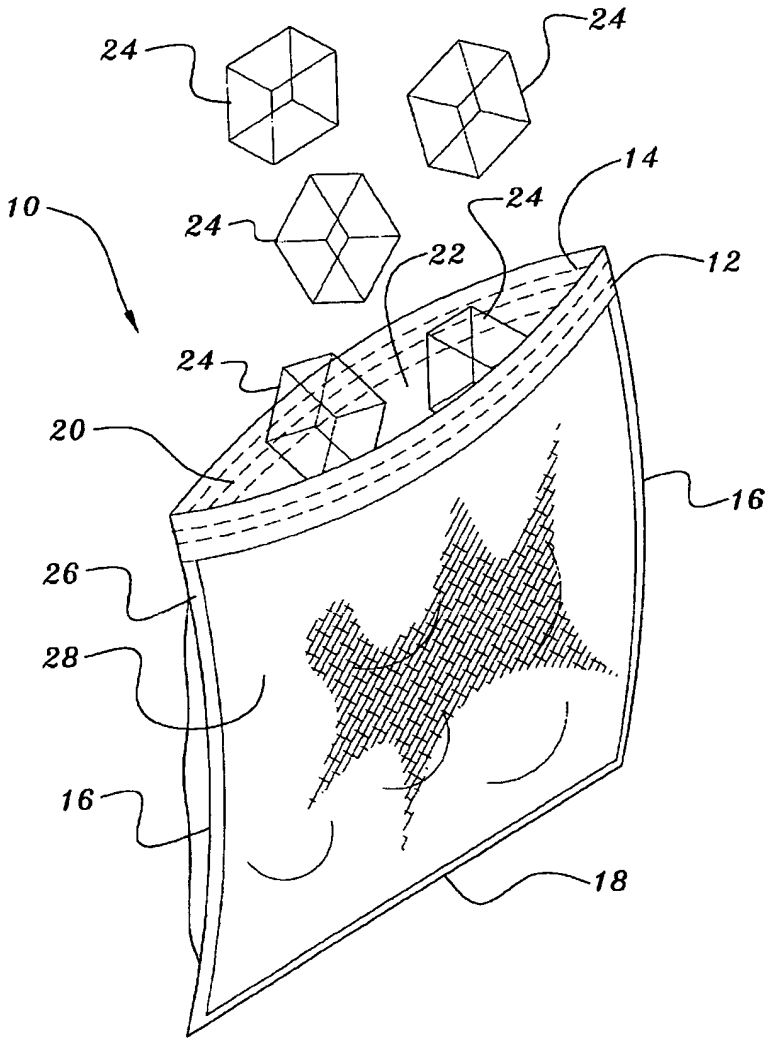
Publication Classification

(51) Int. Cl.[7] F25D 23/12; A61F 7/00

(52) U.S. Cl. 62/530; 62/259.3; 607/112; 607/114

(57) ABSTRACT

A disposable ice pack for treating an area of a person's body that has been traumatized or inured is disclosed. The ice pack includes a polyethylene bag portion having a sealable open top end, a pair of side edges and a closed bottom end forming an inner cavity. The inner cavity receives ice. A closure mechanism is disposed along an inner surfaces of the bag portion top end and provides a water tight seal for the ice pack. A pair of fluid absorbable material sheets are attached by a heat seal along the side edges and bottom end to the bag portion. The sheets of fluid absorbable material permit the disposable ice pack to soak-up any body fluids seeping from the traumatized area. An alternate embodiment further includes a plurality of tie-straps for permitting the ice pack to be wrapped around a person's body part. The tie-straps are attached by the heat seal.



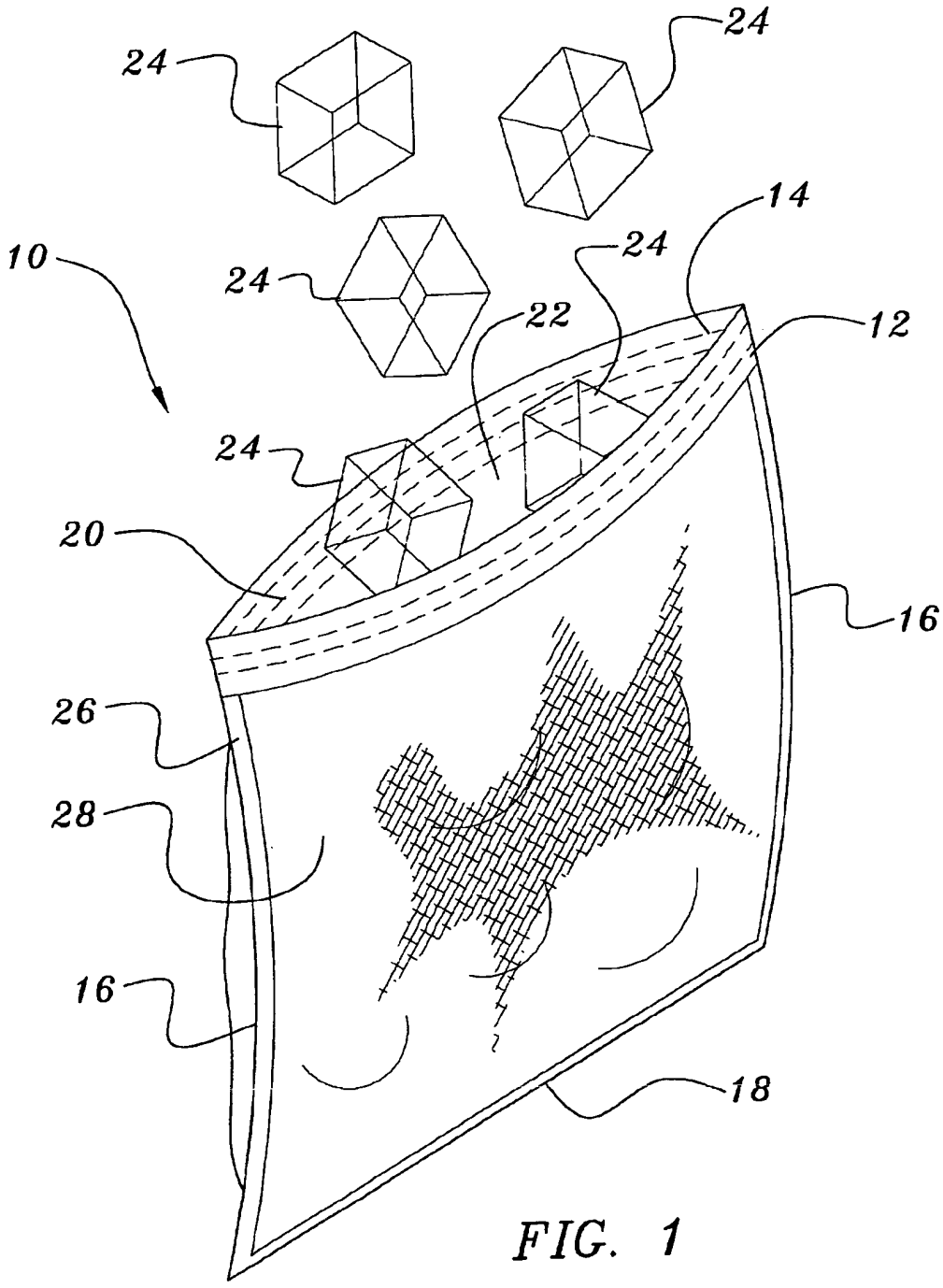


FIG. 1

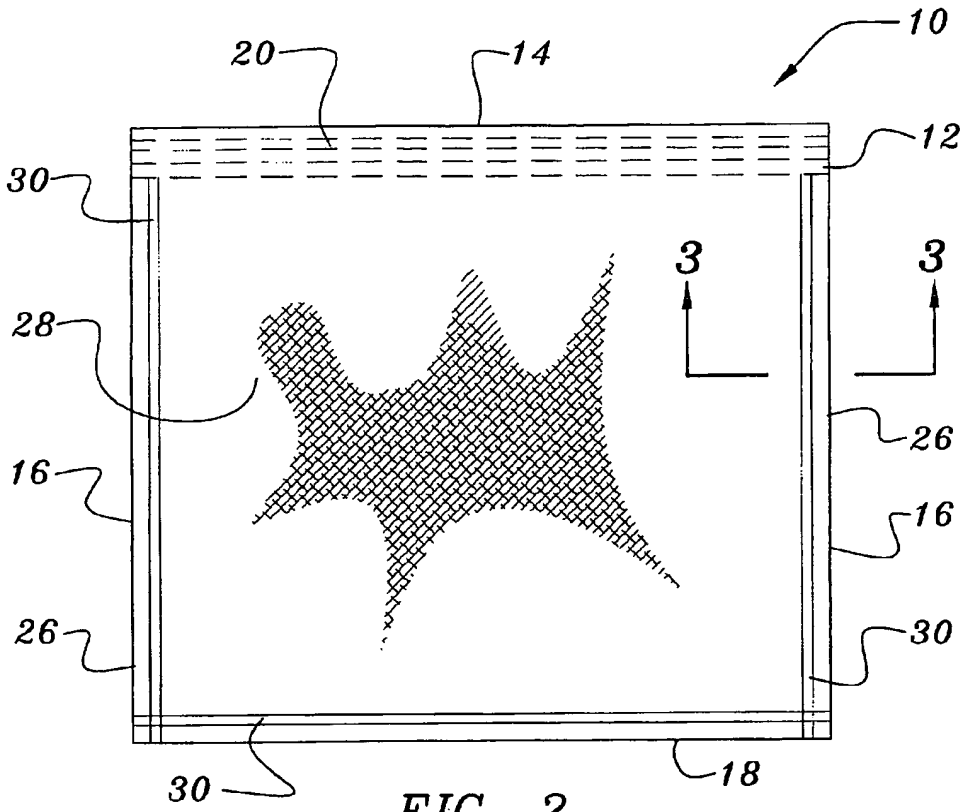


FIG. 2

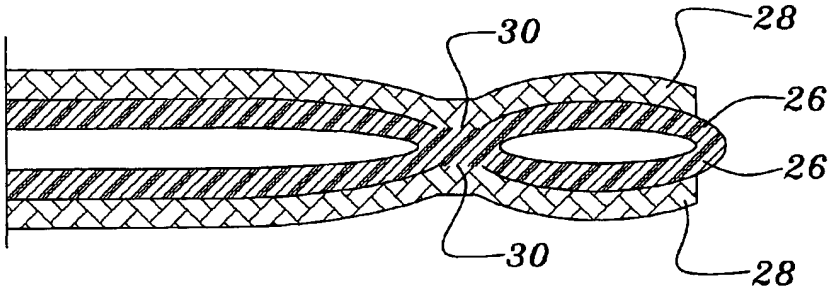


FIG. 3

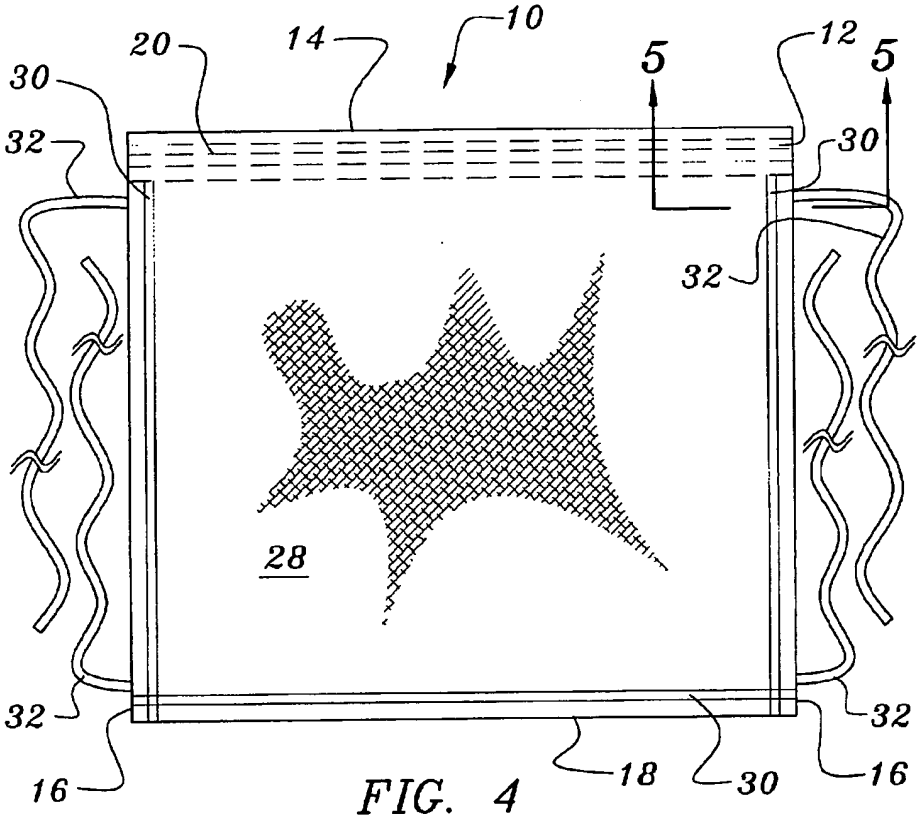


FIG. 4

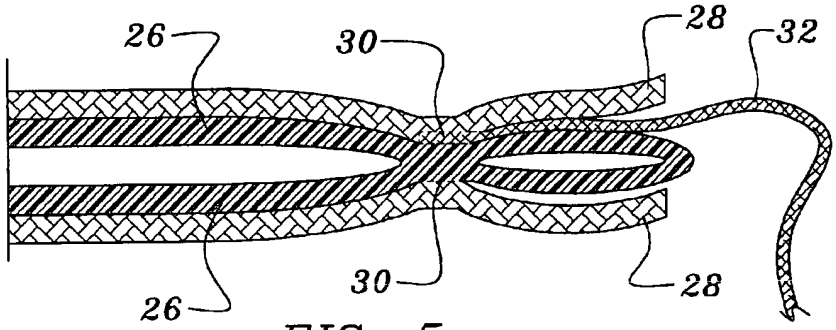


FIG. 5

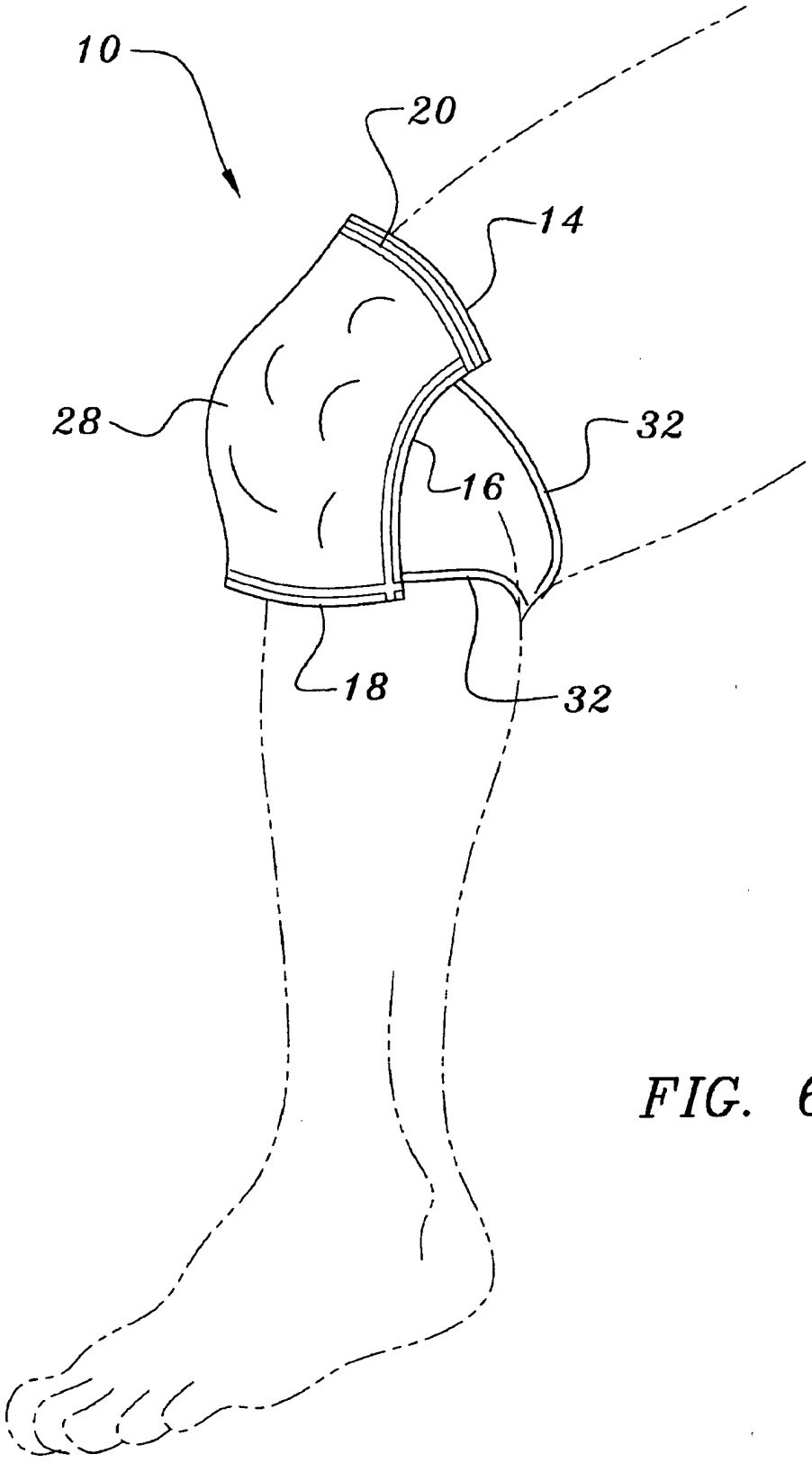


FIG. 6

DISPOSABLE ICE PACK

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates generally to ice packs. More particularly, it relates to a disposable ice pack having a liquid absorbable material disposed about outer walls for applying to a wounded body part wherein body fluids, such as blood, may be seeping from the wound.

[0003] 2. Description of the Prior Art

[0004] Ice and heat packs are known in the prior art. Both devices are known to assist in medical care for bruises, cuts, swelled joints, muscular strain and the like. For instance, it is known that the application of heat assists in muscular strain once swelling has reduced at the point of strain. Accordingly, hot water bottles can be used to apply heat directly to the muscular strained area. U.S. Pat. Nos. 1,711,876 and 1,819,913 both describe hot water bottle devices which can be used for heat treatment. Hot water is poured into these devices and closed, whereafter the device can be applied directly to a muscular strain.

[0005] At least one prior art invention suggests a device which can accommodate both heat or ice. In particular, U.S. Pat. No. 1,927,751 discloses a cover for a hot water bag or ice bag. This device employs straps which can be used to secure the device to a patient.

[0006] The use of ice to reduce swelling and inflammation of a wounded body area of a person is known to assist in the healing of that area. When trauma inflicts a body part, such as a knee, for example, swelling and inflammation of that area can occur. Inflammation is the result of the body introducing additional blood flow to the traumatized area. Additional blood flow assists in the healing of the wounded area by carrying away damaged or dead tissue. Swelling is the body's way of providing a "natural splint" to the traumatized area. Unfortunately both inflammation and swelling can cause additional pain to the person due to the force exerted upon the traumatized area. It is therefore advantageous to reduce the swelling and inflammation, and hence the need to apply ice to the inflicted body part.

[0007] Devices to assist in the reduction of inflammation and swelling are known. For instance, U.S. Pat. No. 4,628,932 describes an ice pack for use on a person's knee. Two compartments are employed to receive the ice. This device is helpful in the reduction of inflammation and swelling to a person's knee but is unfortunately limited in many ways. For instance, the device is limited for use on joints such as knees and elbows and lacks the structural components to be adaptable to other body parts. Further, it lacks an outer layer which could be used to reduce the temperature of the outside of the bag, which would make the bag more comfortable to hold by a person, and further lacks an absorbable material layer which could soak-up body fluids which may seep from the wounded area. This device could be wrapped in a dish towel. However, if any body fluids seep from the wound (i.e., blood), the dish towel would then need to be thrown away. This results in added expense and waste of a perfectly good towel. A person could instead wrap paper towels around the bag, but this too can add expense. Further, paper towels typically do not provide amble resistance from the coldness of the ice pack.

[0008] Some inventions have attempted to add an outer layer to their respective ice bag or heat pack. Such can be seen in U.S. Pat. Nos. 5,074,300, 5,133,348 and 5,456,704. Unfortunately, all of these inventions fall short of disclosing, let alone teach of suggest, a disposable ice pack having a fluid absorbable outer layer which soaks-up any body fluids of the wound and at the same time permits a person to hold the ice pack to the wound without being uncomfortable to hold due to the coldness of the ice pack. Such a device is clearly needed to overcome all of the deficiencies of the prior art.

SUMMARY OF THE INVENTION

[0009] I have invented an improved ice pack for use in treating body part wounds. My device is disposable, inexpensive to manufacture and autoclavable. The device includes a bag portion made to retain ice or a frozen ice pack made of a chemical composition enclosed within a soft pliable shell. The bag portion is constructed from a material which precludes or significantly limits moisture from soaking therethrough. A soft and sanitary fluid absorbable material is employed along opposed outer walls of the bag portion. In a preferred embodiment, the fluid absorbable material is attached to the bag by a heat seal along at least two side edges. The fluid absorbable material is capable of absorbing body fluids which may seep from a traumatized body part. The fluid absorbable material also reduces the transfer of heat thereby making the bag more comfortable to hold against the body part by a person's hand such that it does not get too cold. It further assists in eliminating any sweating that may occur from the bag portion.

[0010] The bag portion has a top open end for permitting the ice cubes or frozen ice pack to be inserted therewithin. A watertight closure mechanism is provided along the top open end and permits the ice pack to be closed such that nothing falls from out of the bag portion.

[0011] A set of tie-straps can be included for permitting the ice pack to be tied to person's body part, such as, for example, a knee. The tie-straps are held in place in between the an outer wall of the bag portion and bottom surface of the fluid absorbable material by the heat seal.

[0012] Accordingly, it is an object of the present invention to provide an improved ice pack which is disposable, inexpensive to manufacture and autoclavable.

[0013] It is a further object to provide an improved ice pack which can absorb fluids which may seep from a traumatized body part while the ice pack is employed.

[0014] It is still a further object to provide an improved ice pack which reduces the transfer of heat thereby making it more comfortable to hold against the body when in use.

[0015] It is still yet a further object to provide an improved ice pack which can have alternate tie-straps for permitting the ice pack to be attached to a person's wounded body part without the need to hold the ice pack by hand.

[0016] Other objects, aspects and uses will be appreciated when consideration is taken herein of the below set forth drawings, detailed description and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The invention may be best understood by those having ordinary skill in the art by reference to the following

detailed description when considered in conjunction with the accompanying drawings in which:

[0018] **FIG. 1** is a perspective view of the novel disposable ice pack of the present invention, illustrating how ice cubes can be inserted through an open end and retained within a cavity of the pack;

[0019] **FIG. 2** is a front elevational view thereof;

[0020] **FIG. 3** is a cross-sectional view along lines **3-3** of **FIG. 2**;

[0021] **FIG. 4** is a front elevational view of an alternate embodiment of the present invention having a plurality of tie-straps for attaching the ice pack to a body part;

[0022] **FIG. 5** is a cross-sectional view along lines **5-5** of **FIG. 4**; and

[0023] **FIG. 6** is a perspective view of the alternate embodiment of the present invention employed around a knee cap of a person.

DETAILED DESCRIPTION OF THE INVENTION

[0024] Throughout the following detailed description, the same reference numerals refer to the same elements in all figures.

[0025] Referring to **FIG. 1**, an improved disposable ice pack **10** of the present invention is shown. Ice pack **10** is generally square-shaped and includes a bag portion **12** having an open top end **14**, a pair of closed side edges **16** and a closed bottom end **18**. Open top end **14** is provided with a closure mechanism **20**. In the preferred embodiment, closure mechanism **20** employs a resealable closure configuration typically seen in the product known under the trademark Zip-Lock®. Closure mechanism **20** provides a water tight seal to ice pack **10** and further prohibits anything inserted therewithin from falling out when closure mechanism **18** is sealed.

[0026] With continuing reference to **FIG. 1**, bag portion **12** and its respective open top end **14**, side edges **16** and closed bottom end **18** forms an inner cavity **22** which is used to retain ice cubes **24** or a freezable chemical composition having a pliable outer shell, such as an ice pack (not shown).

[0027] Referring to **FIG. 3**, it is shown that bag portion **12** has opposed outer walls **26** on which a sheet of fluid absorbable material **28** is attached juxtaposed to each bag portion outer wall **26** by a heat seal **30**. Accordingly, in the preferred embodiment, the present invention utilizes at least a pair of heat seal points proximal to bag portion side edges **16** (see **FIG. 2**). However, a third heat seal point, disposed proximal to bag portion closed bottom end **18** can also be employed to provide a greater adherence of each sheet of fluid absorbable material **28** to each bag portion outer wall **26** as illustrated in **FIG. 3**. In both embodiments, however, the heat seal points **30** run parallel to the respective side edge **16** or bottom end **18**. In the preferred embodiment, the width of each heat seal point **30** is about 0.09" and the distance between an outer edge of each heat seal **30** to the respective bag portion side edge **16** or bottom end **18** is about 0.12". Although not shown, an alternate embodiment of the present invention could include a bag portion **12** having a single sheet of fluid absorbable material **28** on one bag portion outer wall **26**.

[0028] Referring to **FIG. 4**, an alternate embodiment of the present invention is shown. In such alternate embodiment, ice pack **10** includes all the features of the preferred ice pack, as fully discussed hereinabove, with the addition of a plurality of tie-straps **32**. In the preferred embodiment of ice pack **10** having tie-straps **32**, four tie-straps **32** are employed. One of each of the tie-straps **32** is attached at one of each of four corners **34** of bag portion **12**. As shown in **FIG. 5**, each tie-strap **32** is attached in between a bottom surface of the sheet of fluid absorbable material **28** and an outer surface of the bag portion outer wall **26** by the heat seal **30**. Tie-straps **32** are made from a soft flexible material so that it is comfortable to a person if employed around a body part. In such a scenario, for example, as shown in **FIG. 6**, tie-straps **32** can be used to employ ice pack **10** around a person's knee.

[0029] In the preferred embodiment, bag portion **12** should be constructed from a material which prohibits or least minimizes moisture from soaking through outer walls **26**. For example, polyethylene can be used for bag portion **12**. Since ice pack **10** is meant to be disposable it would be advantageous to construct bag portion from a material which breaks down quickly in the environment. Further to the preferred embodiment, the sheets of fluid absorbable material **28** should possess a high absorption quality. A two fiber cloth material is preferred for the sheets of fluid absorbable material **28** such that a first fiber is constructed of alpha-cellulose and the a second fiber is constructed of polyester. If so desired, the two fiber material can employ a two color configuration, for example, blue and white. If such a case, the second fiber (polyester) can be made of blue ink and contain cellulose acetate sorbate.

[0030] Further to the preferred embodiment, a heat weld is used to seal the sheets of fluid absorbable material **28** to the bag portion outer walls **26**. A seam sealer can be used to accomplish the heat weld. For large production runs, a seam sealer tool specifically designed to the exact dimensions of the ice pack **10** would be most efficient and economical. Further, if the thickness of each bag portion outer wall **26** is generally equal to the thickness of each sheet of fluid absorbable material **32**, a better heat seal **30** can be made. In the preferred embodiment, the thickness of bag portion **12** is in the range of 1¼ mils to 2½ mils, with 2½ mils being the preferred thickness.

[0031] Equivalent elements can be substituted for the ones set forth above such that they perform the same function in the same way for achieving the same result.

Having thus described the invention what is claimed and desired to be secured by Letters Patent is:

1. A disposable ice pack for receiving and retaining a frozen material and for compressing against an area of a person's body that has been traumatized, the disposable ice pack comprising:

a) a bag portion having a sealable open top end, a closed bottom end and a pair of opposed side edges forming an inner cavity, a closure mechanism disposed along inner surfaces of the top end providing a water tight seal to the ice pack, and a pair of outer walls;

b) at least one sheet of fluid absorbable material attached juxtaposed to one of the bag portion outer walls, the at least one sheet of fluid absorbable material making

contact with the person's traumatized body area and absorbing any body fluids seeping therefrom; and

c) the inner cavity receiving and retaining the frozen material.

2. The disposable ice pack of claim 1, wherein the bag portion is generally square-shaped.

3. The disposable ice pack of claim 1, wherein the bag portion is constructed of polyethylene.

4. The disposable ice pack of claim 1, wherein the at least one sheet of fluid absorbable material is constructed of a two fiber cloth comprising a first fiber of alpha-cellulose and a second fiber of polyester.

5. The disposable ice pack of claim 1, wherein a pair of fluid absorbable material sheets are employed, one sheet each attached juxtaposed to one each of the bag portion outer walls.

6. The disposable ice pack of claim 5, wherein the pair of fluid absorbable material sheets are attached to the bag portion outer walls by a heat seal.

7. The disposable ice pack of claim 6, wherein the heat seal is disposed along each bag portion side edge in parallel relationship thereto between each bag portion outer wall and each sheet of fluid absorbable material.

8. The disposable ice pack of claim 7, wherein an additional heat seal is provided along the bag portion bottom end in parallel relationship thereto between each bag portion outer wall and each sheet of fluid absorbable material.

9. The disposable ice pack of claim 1, wherein the thickness of the bag portion is generally equal to the thickness of the at least one sheet of fluid absorbable material.

10. The disposable ice pack of claim 1, wherein the thickness of the bag portion is in the range of 1¼ mils to 2½ mils.

11. The disposable ice pack of claim 1, wherein the thickness of the at least one sheet of fluid absorbable material is in the range of 1¼ mils to 2½ mils.

12. The disposable ice pack of claim 1, wherein the frozen material is chosen from the group including ice and a pliable container of a freezable chemical composition.

13. The disposable ice pack of claim 1, further comprising a plurality of tie-straps for attaching the disposable ice pack to the traumatized area of the person's body.

14. The disposable ice pack of claim 13, wherein four tie-straps are employed, one each attached by a heat seal at four opposed corners of the ice pack between one of the bag portion outer walls and the at least one sheet of fluid absorbable material.

15. A disposable ice pack for receiving and retaining ice and for compressing against an area of a person's body that has been traumatized, the disposable ice pack comprising:

a) a generally square-shaped bag portion having a sealable open top end, a closed bottom end and a pair of opposed side edges forming an inner cavity, a closure mechanism disposed along inner surfaces of the top end providing a water tight seal to the ice pack, and a pair of outer walls;

b) two sheets of fluid absorbable material, one each attached juxtaposed to one of the bag portion outer walls, one of the two sheets of fluid absorbable material making contact with the person's traumatized body area and absorbing any body fluids seeping therefrom; and

c) the inner cavity receiving and retaining the ice.

16. The disposable ice pack of claim 15, wherein the bag portion is constructed of polyethylene.

17. The disposable ice pack of claim 15, wherein each of the two sheets of fluid absorbable material are constructed of a two fiber cloth comprising a first fiber of alpha-cellulose and a second fiber of polyester.

18. The disposable ice pack of claim 15, wherein the two sheets of fluid absorbable material are attached to the bag portion outer walls by a heat seal along the pair of opposed side edges and the bottom end.

19. The disposable ice pack of claim 15, wherein the thickness of the bag portion is in the range of 1¼ mils to 2½ mils and the thickness of each of the two sheets of fluid absorbable material is in the range of 1¼ mils to 2½ mils.

20. The disposable ice pack of claim 15, further comprising a plurality of tie-straps for attaching the disposable ice pack to the traumatized area of the person's body, one each attached by a heat seal at four opposed corners of the ice pack between one of the bag portion outer walls and one of the two sheets of fluid absorbable material.

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